McGRAW-HILL CO. OF CALIF. DECEMBER, 1938 25c A COPY

ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

★ ★ ★ ★ Christmas Light ★ LET THE INDUSTRY SET THE STANDARD

The thoughtful giver chooses an Electrical gift
SEE THEM NOW AT YOUR ELECTRICAL DEALER
AT YOUR ELECTRICAL DEALER
Give Electrical Gifts this Christmas
ECONOMICAL · USEFUL
A few suggestions from the many items now on display by YOUR ELECTRICAL DEALER
ELECTRICAL GIFTS ARE MODERN · DURABLE · ACCEPTABLE · BEAUTIFUL · SMART
SEE YOUR ELECTRICAL DEALER
A HINT TO MR. WISE . . . . .
by Chous
GIVE ELECTRICAL GIFTS
Christmas Specials
Thermador Auxiliary Electric Heaters

Widening the Appliance Market

"See Your Dealer For Electrical Gifts" Is Theme of Edison Christmas Promotion

Special Christmas merchandising is an important part of the Edison Company's year-around promotion of electrical appliances. Timely newspaper advertisements and direct mail literature tell buyers the advantages of giving electrical gifts. As always, this promotion carries the phrase, "See Your Dealer," and helps make Christmas merry for electrical dealers in Edison territory.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

12-38

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The All-Industry Magazine of Progress

ELECTRICAL WEST

MEMBER AUDIT BUREAU OF CIRCULATIONS

ESTABLISHED 1887 AND INCORPORATING THE "ELECTRICAL JOURNAL," "JOURNAL OF ELECTRICITY, POWER & GAS" AND "JOURNAL OF ELECTRICITY"

ABP

McGRAW-HILL COMPANY OF CALIFORNIA
883 Mission Street, San Francisco

James H. McGraw
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Howard Ehrlich, President
Roy N. Phelan
Secretary and Treasurer

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Between Covers

ELECTRICAL men don't like publicity. That's the one conclusion your editors can draw after weeks of futilely trying to learn something about this issue's authors. Here's the best we can do:

W. T. Telligan (p.18) was a snap. That's a pseudonym. Nuf said.

C. N. Parker (p.26) is engineer for Nev.-Cal. Electric Corp. Young—see picture—, he graduated from Cal. Tech. in '24. Entered Nev.-Cal.'s students' training course; then took a position as assistant engineer in the Imperial district office. After several years, he transferred to the main office in Riverside. Recently he's been associated with the distribution engineering department. His hobbies are boys' work and gardening.

A. W. Flippin graduated from Oregon State, '26; has been with P.G. & E. for 12 yr., the last 8 as operating foreman, East Bay Div. C. R. Machen graduated from California, '28; has been in the same division of P.G. & E. as sub-foreman since. Reticent about themselves, they say plenty about underground construction (p.21).

H. J. Phillip (p.47) puzzled us. We knew he was with the L. A. Bureau of P. & L.; but in what capacity? We wrote and asked for a sketch of his activities. He answered: "Kidding the public for the past 35 yr."

Harold L. Gerber (p.50) is the man Ralph Wiley, chief of the San Francisco Dept. of Electricity, calls in when there's a complicated problem to be solved. Gerber worked in P.G.&E.'s meter department, then practiced as consulting electrical engineer. He's now chief inspector of the S. F. department and secretary-treasurer of the Southwestern Section, IAEI.

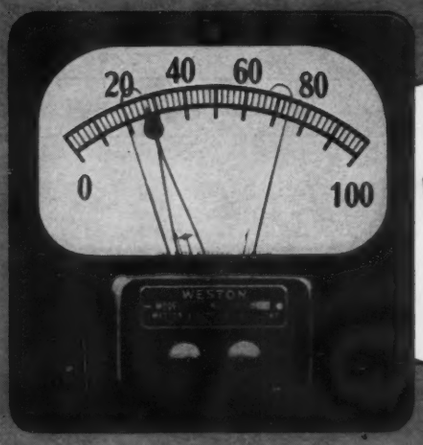
And now to other matters:

First off—Merry Christmas. The saying of which reminds us that another year is dead. It hasn't been the best year in history, but it hasn't been the worst either. Anyway, prospects for '39 are bright.

For ELECTRICAL WEST they are especially bright. Watch for our redesigned, more readable January issue and see if this isn't true.

NOW! CONTACT MAKING INSTRUMENTS WITH HIGH SENSITIVITY, DEPENDABLE CONTACT ACTION!

MAGNETIC CONTACT TYPE Model 837



NON-MAGNETIC CONTACT TYPE Model 838

Typical Applications for WESTON Contact Making Instruments

Off Frequency Alarm
Ground Leakage Alarm
Reverse Current Control
Over and/or Under Voltage Alarm
Over and/or Under Current Alarm
Peak Load Alarm or Control
Bearing Over-Temperature Alarm
Winding Over-Temperature Alarm
Over and/or Under Speed Alarm
Control for Paralleling D-C Generators

With the Model 837-838 series, WESTON provides a complete line of contact making instruments, for use where close control or limit indication of electrical circuits is desired.

The Model 837 series employs positive, non-chattering magnetic contacts, separately adjustable over the entire scale, and easily reset by push-button releases on front of the case.

The Model 838 series likewise has separately adjustable contacts, but requires no manual reset. It employs a separate auxiliary relay (Model 810) which handles the load circuit.

Both models are available in frequency meters, d-c voltmeters or ammeters, a-c voltmeters or ammeters, power factor meters, d-c and single phase a-c wattmeters, polyphase wattmeters, and thermo ammeters . . . in all standard 6" rectangular instrument ranges.

A bulletin is available describing these practical contact making instruments. Send for your copy . . . Weston Electrical Instrument Corporation, 577 Frelinghuysen Avenue, Newark, N. J.

WESTON *Instruments*

FIFTY YEARS OF 1888 1938 INSTRUMENT LEADERSHIP

PACIFIC COAST REPRESENTATIVES

Eicher & Bratt,
263 Colman Bldg.
Seattle, Wash.

Herman E. Held
420 Market St.
San Francisco, Calif.

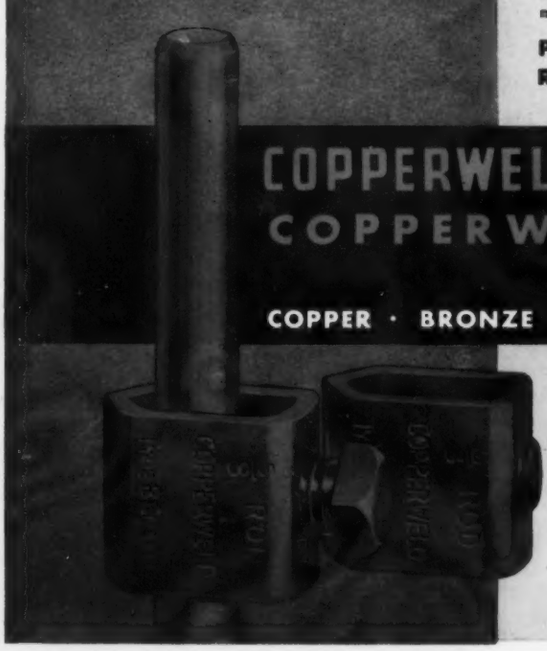
A. A. Barbera,
Subway Terminal Bldg.
Los Angeles, Calif.

Give your Lightning Arresters a Chance—

CONNECT them to:

Calculated effect on resistance (of one grade of soil) with electrode at various depths. Based on uniform soil at all depths.
From Bureau of Standards, Tech. Paper No. 108.

155 Ohms—1 ft.
90 Ohms—2 ft.
63 Ohms—3 ft.
50 Ohms—4 ft.
42 Ohms—5 ft.
37 Ohms—6 ft.
32 Ohms—7 ft.
28 Ohms—8 ft.



DEEPER GROUNDS

Longer electrodes reach permanent moisture levels and reduce seasonal variations in resistance. Additional depth is more effective than greater diameter as ground rod diameter has little effect on the resistance of a driven ground. The National Electrical Code suggests 8-feet as the minimum depth for grounds regardless of the size or number of electrodes used.

NON-RUSTING ELECTRODES

Copperweld ground rods are non-rusting and easy to drive. Their heavy layer of pure copper, inseparably molten-welded to the tough steel core assures dependability and long life.

WITH COPPER-TO-COPPER ROD WIRE CONTACTS

When a Copperweld ground rod is used with a copper ground wire, the connection is copper-to-copper; no danger of harmful corrosion or increased rod-to-wire contact resistance.

USING SIMPLE NON-RUSTING CLAMPS

Copperweld ground clamps, either standard or Type B, made of high strength non-rusting bronze, complete the chain of protection. They provide the simplest and most dependable means of making the connection between the ground rod and ground wire.

Higher resistance grounds reduce the effectiveness of protective equipment. For dependable grounds, use Copperweld non-rusting ground rods—driven to a depth of 8-feet or more—and for dependable connections use simple non-rusting Copperweld clamps.

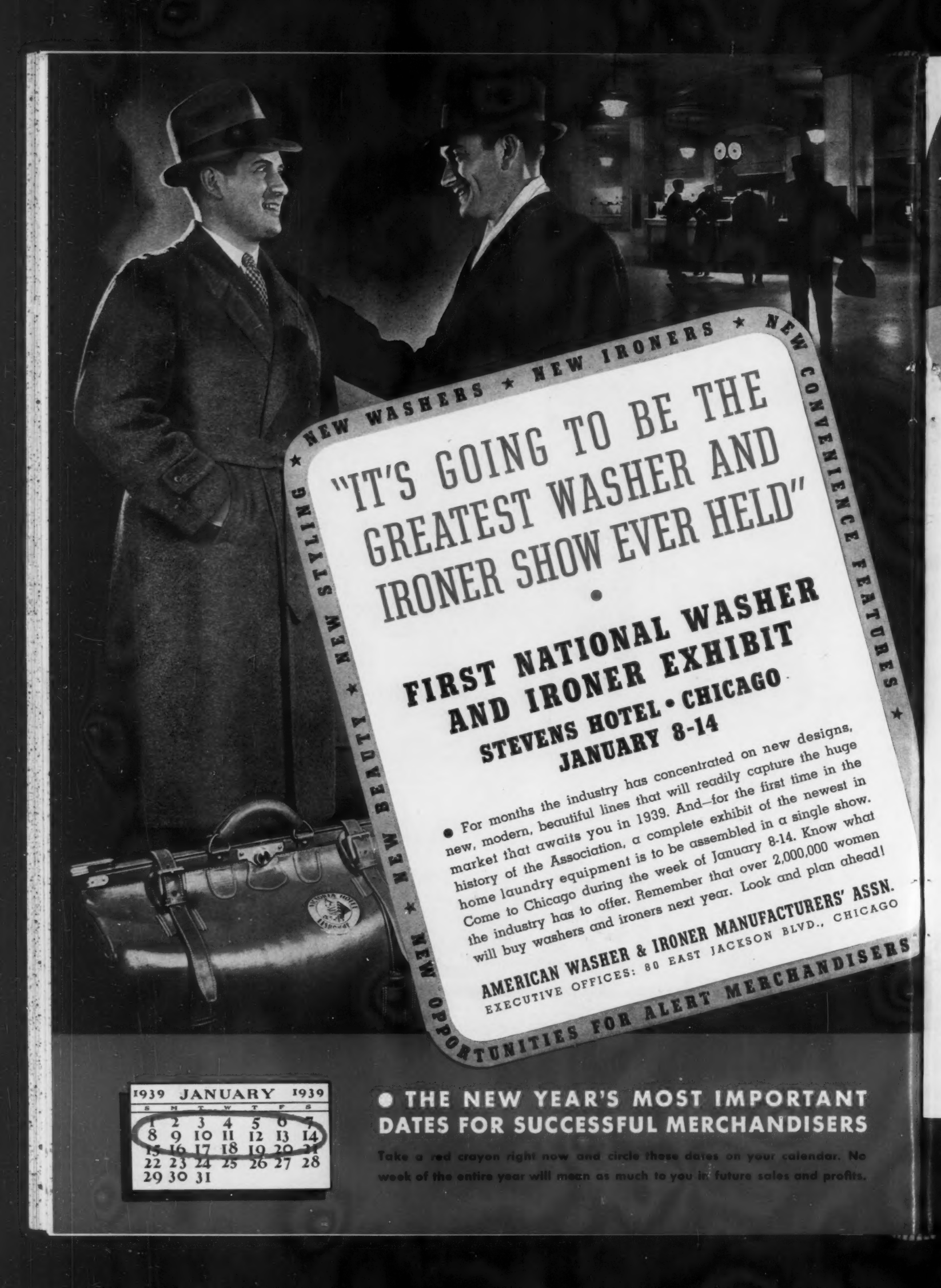
Pacific Coast Representative • C. E. Ingalls
Rialto Building • San Francisco, California

COPPERWELD GROUND RODS and CLAMPS

COPPERWELD STEEL COMPANY

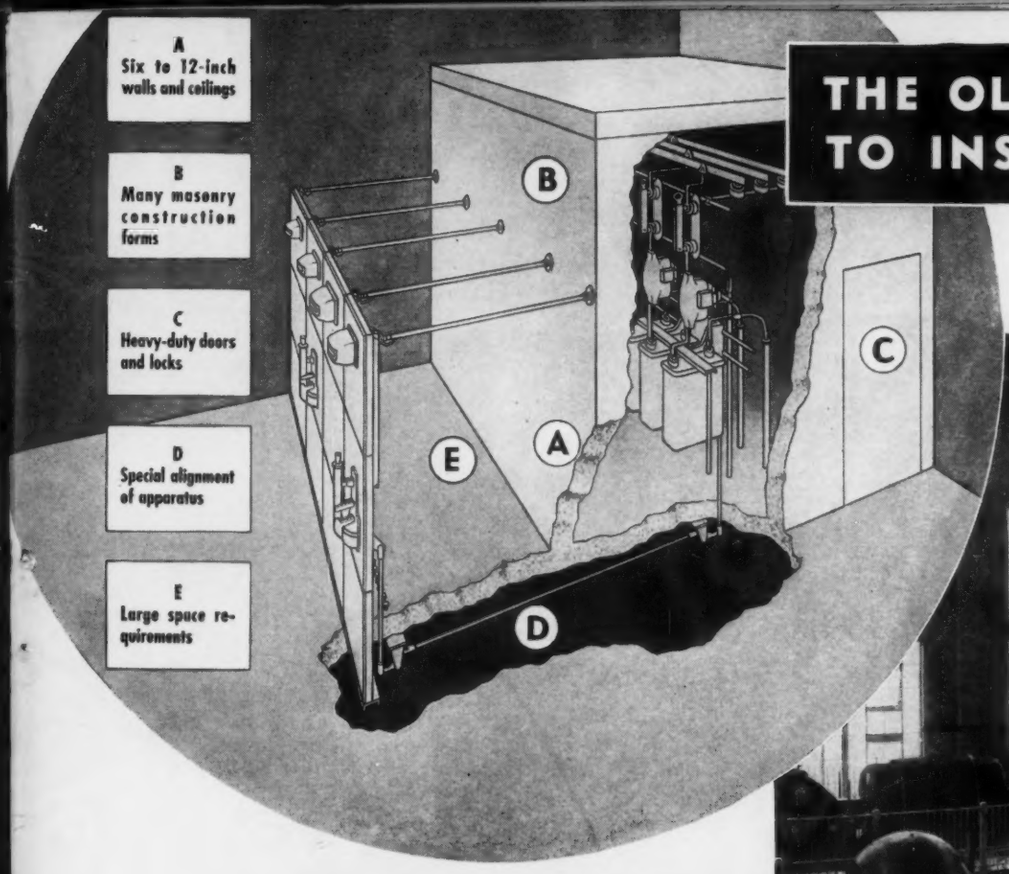
Glassport, Pa.

COPPER · BRONZE · COPPERWELD RODS, WIRE, AND STRAND

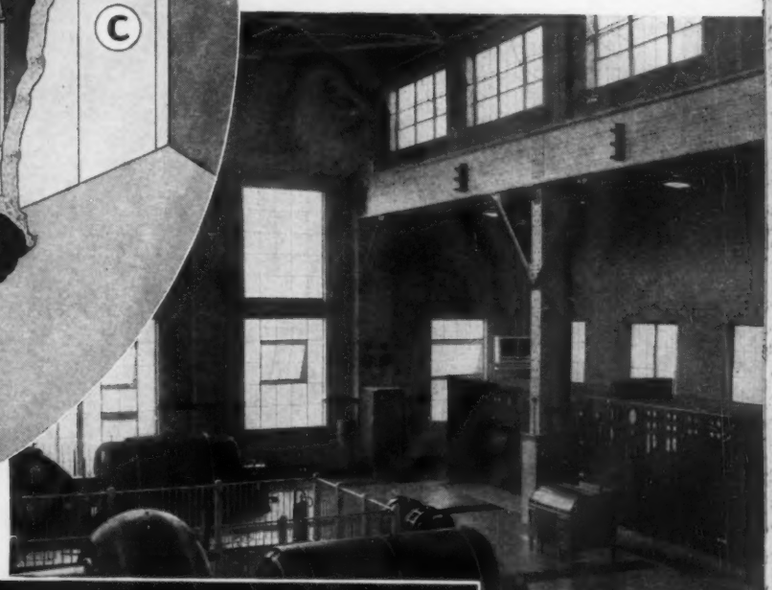

★ NEW WASHERS ★ NEW IRONERS ★ NEW CONVENIENCE FEATURES ★
★ NEW STYLING ★ NEW BEAUTY ★
"IT'S GOING TO BE THE GREATEST WASHER AND IRONER SHOW EVER HELD"
FIRST NATIONAL WASHER AND IRONER EXHIBIT
STEVENS HOTEL • CHICAGO
JANUARY 8-14
• For months the industry has concentrated on new designs, new, modern, beautiful lines that will readily capture the huge market that awaits you in 1939. And—for the first time in the history of the Association, a complete exhibit of the newest in home laundry equipment is to be assembled in a single show. Come to Chicago during the week of January 8-14. Know what the industry has to offer. Remember that over 2,000,000 women will buy washers and ironers next year. Look and plan ahead!
AMERICAN WASHER & IRONER MANUFACTURERS' ASSN.
EXECUTIVE OFFICES: 80 EAST JACKSON BLVD., CHICAGO
OPPORTUNITIES FOR ALERT MERCHANDISERS
1939 JANUARY 1939
S M T W T F S
1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31

• THE NEW YEAR'S MOST IMPORTANT DATES FOR SUCCESSFUL MERCHANDISERS

Take a red crayon right now and circle these dates on your calendar. No week of the entire year will mean as much to you in future sales and profits.



THE OLD, HARD WAY TO INSTALL SWITCHGEAR



NEW, EASY, SAFE WAY

For Your Pocketbook's Sake, Too . . . Put In Metal-enclosed Switchgear

Any way you look at it, buying metal-enclosed switchgear means economy.

Consider:

(1) The benefits in safety and in operating advantage

(2) The completely factory-assembled job that you receive

(3) The savings in over-all installation time and cost

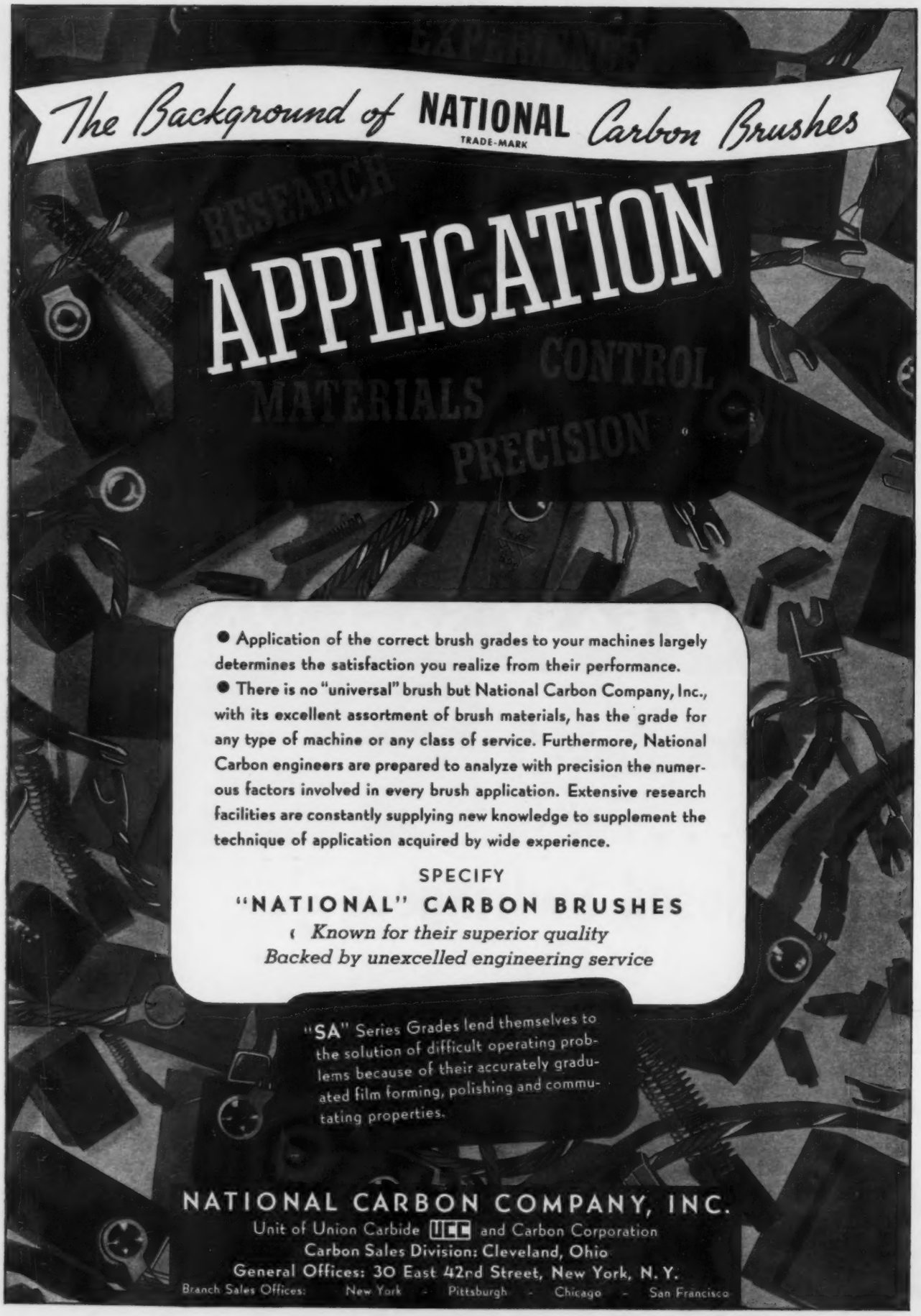
Specify metal-enclosed switchgear for *all* your switching requirements. General Electric, Schenectady, N. Y.

RECOGNITION BY THE N. E. C.

It is significant that, on circuits of 5000 to 15,000 volts, the present National Electrical Code puts metal-enclosed gear in the preferred class. It prescribes that these oil circuit breakers shall have a metal enclosure—or be remotely controlled in a specially constructed fire-resistive vault.

GENERAL ELECTRIC

880-33


The Background of NATIONAL TRADE-MARK Carbon Brushes
APPLICATION
RESEARCH
CONTROL
MATERIALS
PRECISION
● Application of the correct brush grades to your machines largely determines the satisfaction you realize from their performance.
● There is no "universal" brush but National Carbon Company, Inc., with its excellent assortment of brush materials, has the grade for any type of machine or any class of service. Furthermore, National Carbon engineers are prepared to analyze with precision the numerous factors involved in every brush application. Extensive research facilities are constantly supplying new knowledge to supplement the technique of application acquired by wide experience.
SPECIFY
"NATIONAL" CARBON BRUSHES
Known for their superior quality
Backed by unexcelled engineering service
"SA" Series Grades lend themselves to the solution of difficult operating problems because of their accurately graduated film forming, polishing and commutating properties.
NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide UCC and Carbon Corporation
Carbon Sales Division: Cleveland, Ohio
General Offices: 30 East 42nd Street, New York, N. Y.
Branch Sales Offices: New York - Pittsburgh - Chicago - San Francisco

Insure LONG TROUBLE-FREE *performance* AT MODERATE COST

3 SIZES

TYPE 660—FOR VOLTAGES UP TO 8,000
TYPE 670—FOR VOLTAGES UP TO 10,000
TYPE 680—FOR VOLTAGES UP TO 15,000

Handle most PRIMARY line requirements

● Series 600 represents entirely new insulator design in Hemingray Glass—an all-around better insulator for use on distribution primaries. With great mechanical strength, they render long, efficient service under either light or heavy loading conditions. The greater leakage distance assures outage-free performance. The brass bushing provides increased mechanical strength to the insulator in service.

Specify series 600 for lower initial and overall costs. Send for samples now. Owens-Illinois Glass Company, Hemingray Div., Muncie, Ind.

HEMINGRAY INSULATORS

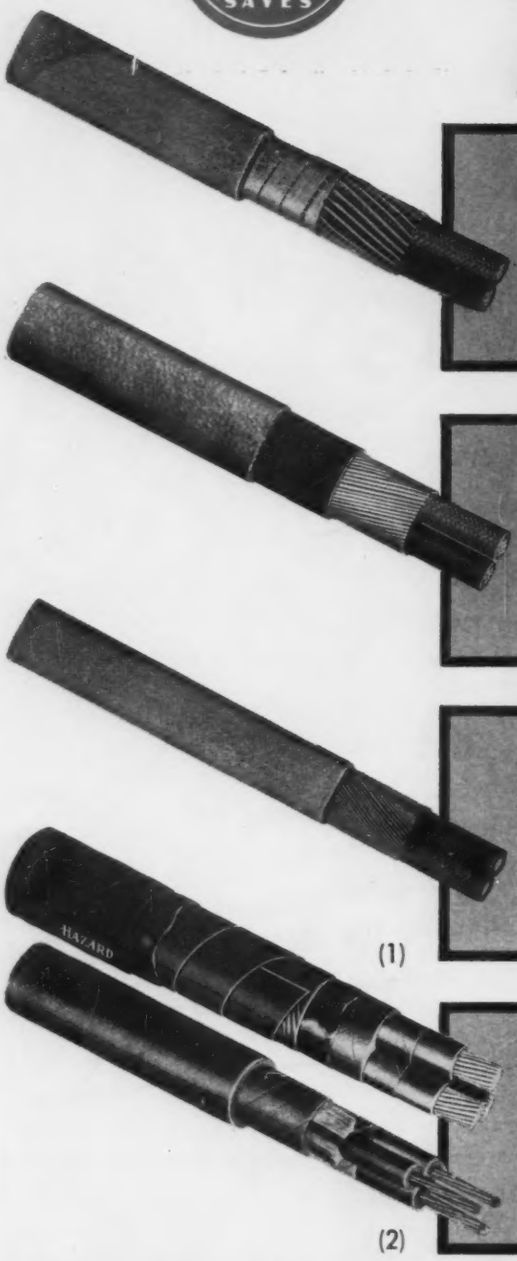
OWENS-ILLINOIS GLASS COMPANY

"First in Glass"

HAZARD

ADEQUATE WIRING SERVES AND SAVES

SERVICE ENTRANCE AND DROP CABLES



SERVICE ENTRANCE CABLE STYLE ABN

costs little, as it may be strapped to house without conduit. May be used with outdoor meter, or through foundation to entrance switch. Concentrically wound uninsulated neutral conductor and closely wound steel tape discourage current diversion.

SERVICE ENTRANCE CABLE STYLE UBN

differs from Style ABN, in that the steel tape is replaced by a heavier double-wrapped tape cushion, and that the concentric conductor has more wires giving a closer coverage to make it diversion-proof.

CONCENTRIC DROP CABLE TYPE SD

from pole to entrance cable on house. With single-hole entrance cap and rigid conduit, it is used from pole to meter. The closely wound concentric conductor makes it diversion-proof. Outer braid is finished with battleship grey paint.

(1)

UNDERGROUND SERVICE ENTRANCE CABLE

for service to or between buildings. Sizes No. 12 and larger. Armortite (1), and Hazasheath (2), are non-metallic armored, and withstand alternate wet and dry conditions, acid or alkaline moisture, and extremes of heat and cold.

(2)

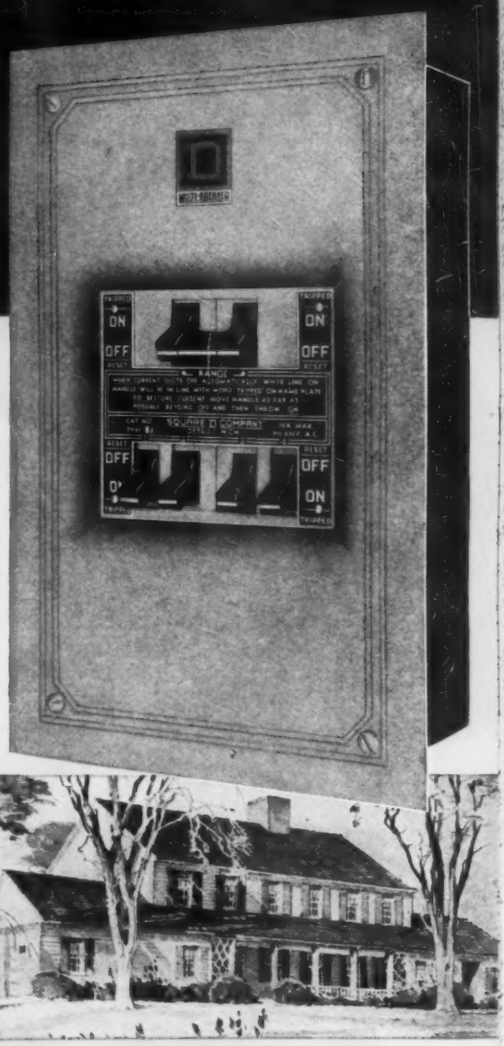
HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.

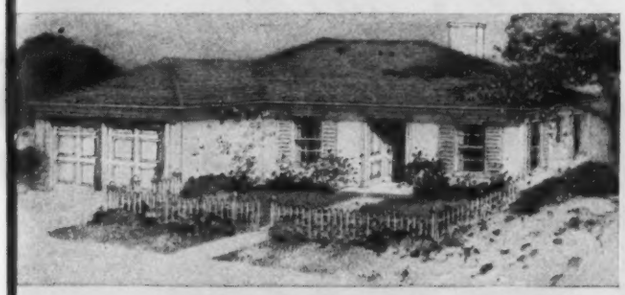
WORKS: WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta Pittsburgh Buffalo Boston Detroit
Seattle Dallas Washington San Francisco St. Louis Los Angeles

How little it costs TO INCLUDE SQUARE D MULTI-BREAKERS IN THESE LIFE HOUSES



Suggested Multi-breakeR installation for the RAMSEY "Traditional" House ($2,000-$3,000 income group) designed by Richard Koch: 4 circuits. 3 for lights, 1 for spare. 29 outlets. Cost $9.50*



For the CALVERT "Traditional" House ($3,000-$4,000 income group) designed by H. Roy Kelley: Electric range. 4 lighting circuits. 44 outlets. Cost . . $11.50*

For the BLACKBOURN "Traditional" House ($5,000-$6,000 income group) designed by Royal Barry Wills: Laundry circuit. Electric range. Electric water heater. 5 lighting circuits. 54 outlets. Multi-breakeRs in basement and on first floor. Cost . . . $22.50*

For the SMITH "Traditional" House ($10,000-$12,000 income group) designed by Aymar Embury: Laundry circuit. Electric range. Electric water heater. 7 lighting circuits. 78 outlets. 4 Multi-breakeRs on 2 floors. Cost . . $34.50*

**No deduction made for equipment which the Multi-breakeR replaces*

When a magazine such as LIFE puts its power behind a home building program, it means business . . . for all of us.

The September 26th issue of LIFE carried a *twenty-two* page section devoted to "8 Homes for Modern Living." Twenty-two pages which included pictures, designs and plans by nationally-known architects, finance suggestions. Well over 10,000,000 people read it.

These LIFE homes are the most talked-about houses in the country. No manufacturer or building trade association could buy this kind of publicity. It can't be bought. Yet, here it is, gratis.

Architects, realtors, department stores, banks—all are following through on this unusually productive activity. *And, obviously, here is an opportunity for electrical wholesalers and contractors to climb aboard a band-wagon that is really going places.*

The Square D Multi-breakeR is certainly an essential part of "The Home for Modern Living" . . . the last word in convenience and safety. How little Multi-breakeRs cost is shown above.

Talk Multi-breakeRs! Get your share of this fast-developing, new business! Square D is backing you with consistent advertising to the people you sell.

CALL IN A SQUARE D MAN

SQUARE D COMPANY

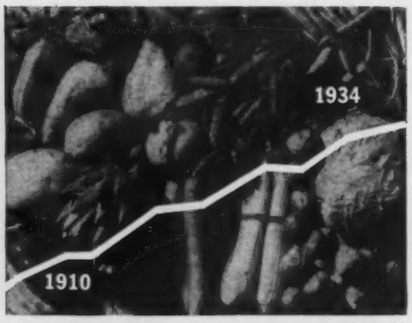
LOS ANGELES - MILWAUKEE - DETROIT

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

YOU HAVE DONE A NOBLE THING

—YOU RETAILERS WHO HAVE SOLD REFRIGERATION TO AMERICA!

Thousands saved yearly by better refrigeration. In one disease alone (enteritis), the electrical refrigerator has been called a main factor in the death rate drop from 100 per 100,000 to 13.

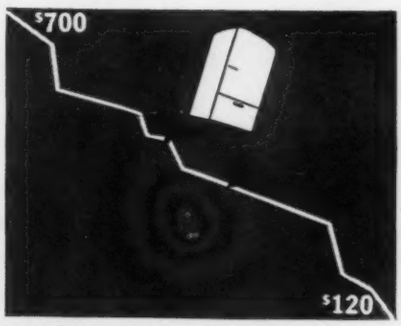


America eats over twice as much of health protecting, body building fresh fruits and vegetables . . . shipped from all over the world, foods only in demand because of home refrigeration.

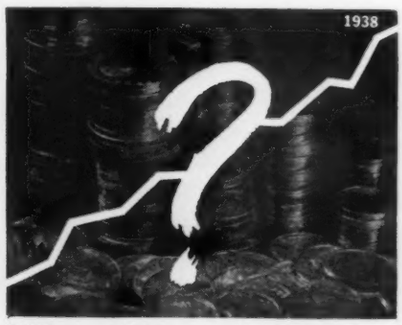
As America Celebrates the 25th Anniversary of Electric Refrigeration in the Home

All Eyes

Every ten years, *a year of life is added* through better living conditions. Doctors credit electrical refrigeration with changing America's eating habits from heavy to well-balanced diet.



Ever-lower prices have brought electrical refrigeration within the reach of every wage-earner. Contrast the cost of the first Kelvinator with present prices, for a Kelvinator many times more efficient.



Millions of dollars saved yearly on food which would otherwise spoil. Electrical refrigeration introduced a new and better way of marketing and of keeping perishable foods constantly safe.

Will Be on Kelvinator!

Kelvinator Invites Every Refrigerator Dealer in America to Share in the Golden Opportunity of the Silver Jubilee

NEW SILVER JUBILEE KELVINATORS TO BE SHOWN JANUARY 2ND

TODAY, every electrical refrigerator salesman and dealer can be proud of the part he's played in making this a finer world. The pictures above tell the story of what has happened since, in 1914, Kelvinator built the first electric refrigerator for the home and began this great industry.

Naturally, you can expect outstanding models in keeping with the Silver Jubilee occasion. These new models are completely new—completely redesigned—the most beautiful refrigerators built.

A new cold-making story will add laurels to Kelvinator's title of Champion Ice Maker . . . a new interior setup will put the teeth in any sales talk . . . a new advertising campaign will sell the Jubilee program to the public . . . a campaign planned to start people thinking about not just the money they can save . . . but the luxuries they can afford . . . an ideal *dealer's campaign*.

This year we expect people to choose Kelvinator as their first refrigerator . . . or as their second on trade-ins. This year we expect so much because the Kelvinator line offers so much.

We urge you to take advantage of this chance of a lifetime—to feature on your floor this new line of Silver Jubilee models . . . to share the spotlight and the profits with us. KELVINATOR, Division of Nash-Kelvinator Corp., Detroit, Mich.

ON JANUARY 2ND A MESSAGE FROM

H. W. Barratt

Vice-President in Charge of Sales for Kelvinator—Division of Nash-Kelvinator Corporation

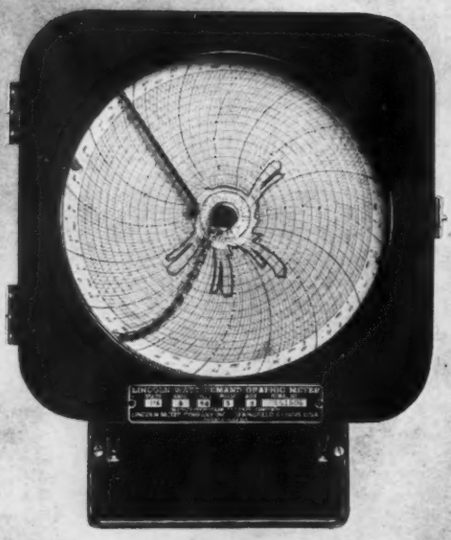
He will make an announcement of vital, personal interest to retail salesmen and to dealers in electrical appliances. This announcement will affect the net profits of dealers and will have a lasting influence upon the earning power and the business future of retail salesmen.

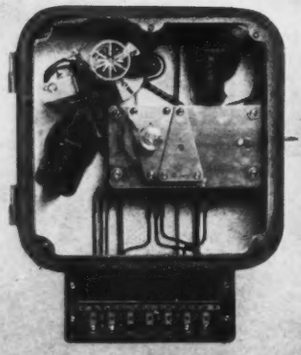
The Silver Jubilee KELVINATOR

GET IN THE SPOTLIGHT WITH KELVINATOR!

LINCOLN

MAXIMUM DEMAND GRAPHICS ELIMINATE THE USE OF CONTACTS



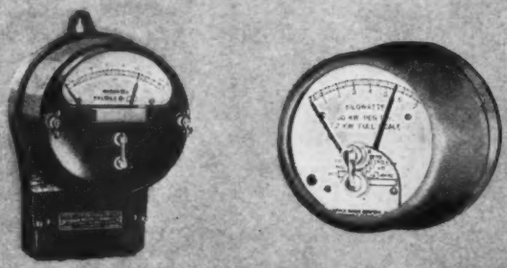


Demand recording devices with delicate electrical contacts present problems which are completely absent when Lincoln Graphic Meters are used. The Lincoln Graphic operates independently of the watthour meter, merely being connected into the same circuit.

The demand measuring element is entirely free of timing mechanisms and rapidly moving parts. A synchronous motor or electrically wound clock has only the duty of driving the recording chart.

The reliability and low maintenance cost of all Lincoln Maximum Demand Meters is best explained by the simplicity of their operation.

INDICATING WATT DEMAND



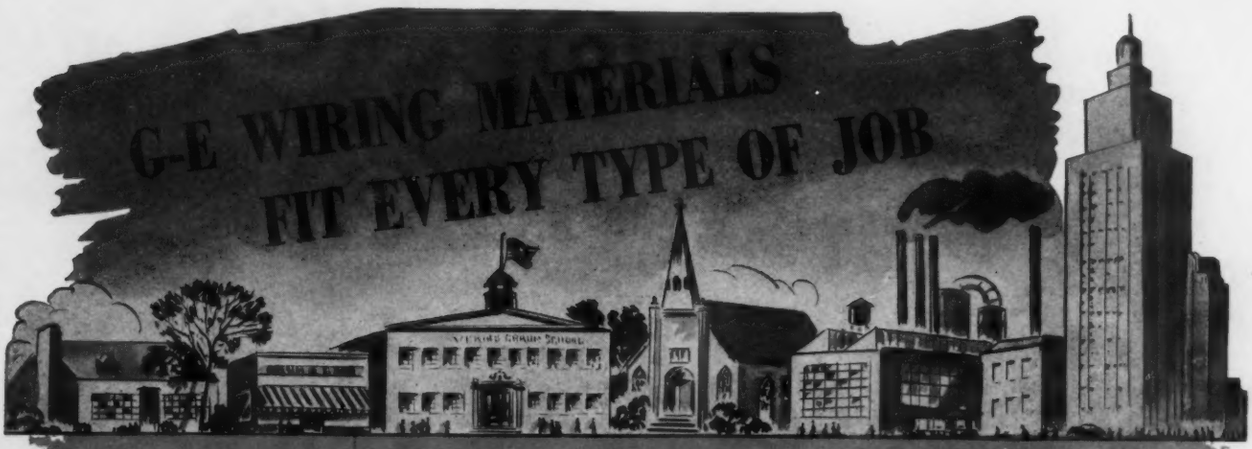
Type WD (bottom connected) and Type WDS (socket mounting) are supplied for both singlephase and polyphase circuits.

INDICATING AMPERE DEMAND

Type 3 ADH (Horizontal) or 3 ADV (Vertical) for measuring demand of 3-phase substation feeders.

LINCOLN METER COMPANY

SPRINGFIELD, ILLINOIS



G-E White Conduit

G-E BX Armored Cable

G-E Boxes and Fittings

G-E Electrical Metallic Tubing

G-E BraidX Non-metallic Sheathed Cable

G-E Building Wire

G-E Branch-circuit Circuit Breaker

G-E Textolite Plates for Convenience Outlets and Switches

G-E Convenience Outlet

G-E Heavy-duty Switch

G-E Sphinx Mercury Switch

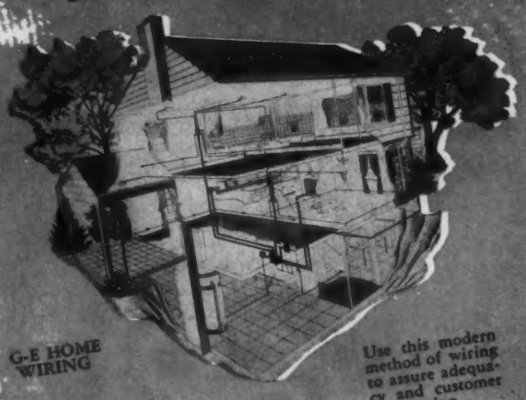
ADEQUATE WIRING SERVES AND SAVES

Whether you are wiring a skyscraper or a one-story cottage, a huge factory or a community theater you'll find exactly the materials you need in the G-E line. It is complete. Moreover, by using G-E materials you will benefit in these five ways:

1. You can buy everything needed at one place.
2. You'll be using materials made by one manufacturer—materials that were designed to be used together.
3. You can be sure of uniform high quality—there'll be no "weak links" in your wiring.
4. You'll be able to get exactly the materials needed for every purpose—no makeshift installations.
5. The wide consumer acceptance of General Electric products will help you to sell and will help to assure customer satisfaction.

For further information about G-E Wiring Materials for ordinary installations or special work see the nearest G-E Merchandise Distributor or write to Section CDW-82112, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn.

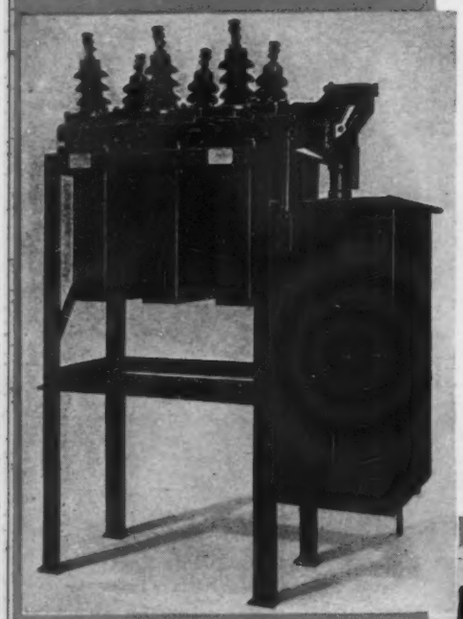
GENERAL ELECTRIC

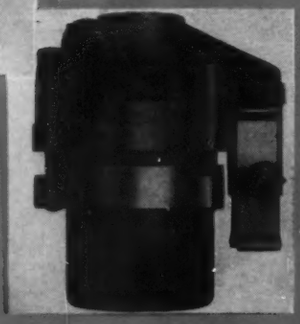


G-E HOME WIRING

Use this modern method of wiring to assure adequacy and customer satisfaction.

PLUG





Get more "Breaks"

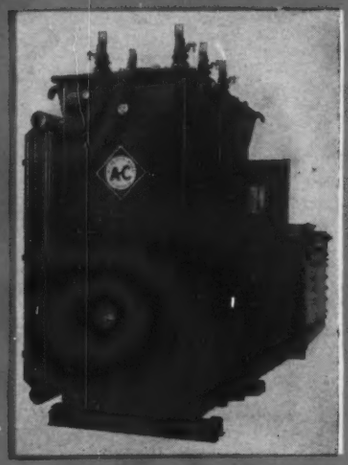
FOR YOUR MONEY! SPECIFY ALLIS-CHALMERS OIL CIRCUIT BREAKERS WITH "QUICK-QUENCH" RUPTORS! Allis-Chalmers Oil Circuit Breakers with Ruptors for your high voltage systems give higher interrupting capacity at lower costs . . . more hours of service between inspections with fewer contact replacements.

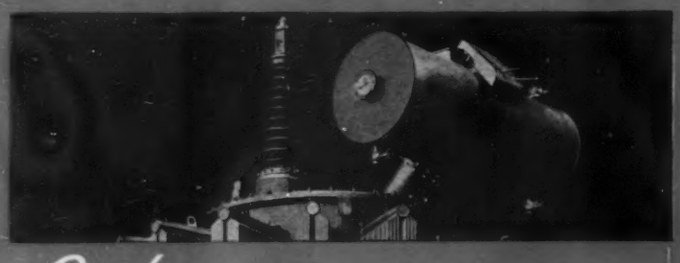
For Ruptors extinguish arcs fast! Their "QUICK-QUENCH" action cuts oil carbonization and contact deterioration to a minimum! Find out how you can get consistent operation without constant attention. Send for Bulletin 1145-B, or call the nearest District Office.

Allis-Chalmers 5/8% HALF-CYCLING STEP REGULATORS GIVE SMOOTHER REGULATION AT LOWER MAINTENANCE COSTS!

Smooth regulation pays a good return on your voltage regulator investment in terms of increased load and customer satisfaction.

That's why the swing is toward 5/8% Half - Cycling Step Regulators. You get closer regulation . . . fewer tap changes for the same regulation . . . and that means less contact deterioration . . . less maintenance cost! Get the whole story on Allis-Chalmers Half-Cycling Step Regulators. Write for Bulletin 1170-C.





Reduce OPERATING COSTS WITH ALLIS-CHALMERS POWER TRANSFORMERS!

If you're looking for more efficient, safer, and money-saving transformer operation . . . specify Allis-Chalmers Power Transformers! At no extra cost you get these extra money-saving features:

No-Load Tap Changer located on the side of the case . . . eliminates danger . . . saves operators' time.

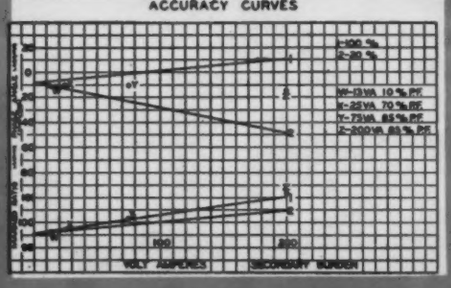
Oil-Sealed System reduces constant replenishment of costly nitrogen . . . cuts maintenance expense.

Uni-Directional Breather maintains the dielectric strength of your transformer oil during years of service.

Make your transformer dollars go farther with these and the many other Allis-Chalmers features available at no extra cost. Write for Bulletin 1182.

Get these Features

WITH ALLIS-CHALMERS POTENTIAL TRANSFORMERS — 1. Enclosed Secondary Terminals—this new exclusive Allis-Chalmers feature gives you a bakelite hood which rotates to receive cable or conduit from any direction . . . bakelite block with clamp-type connections . . . sealable hood. 2. Excellent Ratio and Phase Angle Characteristics as shown by the accompanying curves. 3. High Insulation Strength. 4. Stud Type Primary Bushings.



Get the details about the Type PD Potential Transformers from the Allis - Chalmers representative nearest you.

REVENUE LEAKS

Read How Central Stations Cut Generating and Transmitting Cost ... Protect Profit Margins ... Get More Power per Dollar Spent with the Equipment that Pays for Itself!

When central stations want extra profits, this is what they do! They plug the leaks in their operations . . . make sure that the right equipment is on the right job . . . doing the right job throughout their plants.

For informed engineers the country over have found that the wrong equipment drains the profit side of the ledger. That's why it pays to equip the Allis-Chalmers way . . . with units efficiently handling the particular jobs for which they were designed. It's the way to better profits!

Allis-Chalmers equipment is engineered to cut your costs . . . to pay you more for every dollar you invest . . . to generate more kilowatts more efficiently and to transform those kilowatts into customer revenue more cheaply than ever before.

No wonder that thousands of other informed engineers come to Allis-Chalmers . . . again and again . . . year after year. Engineering background, research, service . . . get you the right equipment to do the job you want done.

Benefit from Allis-Chalmers' broad engineering background, from its research facilities, and from its technical analysis. Find out how you can cut costs in your station . . . plug revenue leaks . . . with the equipment that pays for itself!

THERE IS AN ALLIS-CHALMERS DISTRICT OFFICE CLOSE TO YOU AND READY TO GIVE YOU PROMPT AND COMPLETE CO-OPERATION

SALT LAKE CITY, UTAH KEARNS BUILDING	LOS ANGELES, CAL. ROWAN BUILDING	PORTLAND, OREGON 1311 S. E. UNION AVE.
PHOENIX, ARIZONA LUHRS TOWER	SAN FRANCISCO, CAL. RIALTO BUILDING	SEATTLE, WASH. HENRY BUILDING

DENVER, COLORADO, CONTINENTAL OIL BUILDING

869

ELECTRICAL DIVISION

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

"WE LIKE YOUR NEW REGULATOR, GENERAL ELECTRIC"

"WE have always preferred the induction principle for feeder-voltage regulators, and now you enable us to use it with greater economy."

Other comments coming in from users of our new induction regulator for station or branch service are equally favorable:

1. "We like the idea of *one* design for use indoors or out."

2. "We have always found that when a product looks right it's usually built right. Your regulator is the best looking and most practically designed unit we have seen."

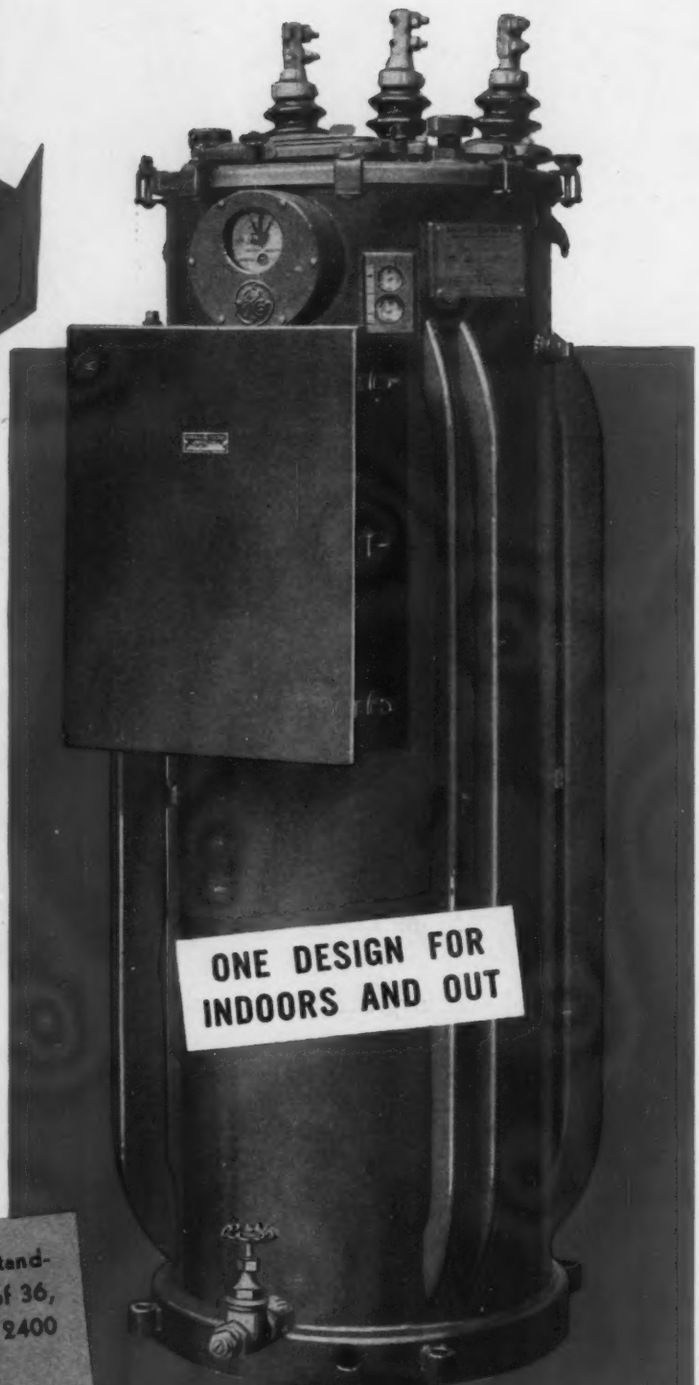
3. "It's a real advantage to be able to install it without auxiliary or interconnecting wiring on single- and three-phase circuits."

4. "We like the dynamic braking and the self-contained motor and control supply."

Summed up, these and many other favorable comments support our original announcement that this new regulator would give you lower installed costs, reduced maintenance, and greater flexibility of application. Be sure to investigate this design before buying new regulators. For complete information, ask for Bulletin GEA-2985. General Electric Company, Schenectady, N. Y.

NOTE

This new induction regulator supersedes the standard G-E outdoor and indoor types, in ratings of 36, 48, 60, and 72 kva single-phase, 60 cycles, 2400 volts and 4800 volts.



GENERAL ELECTRIC

350-141

ELECTRICAL WEST
December, 1938
Vol. 81, No. 6

ELECTRA'S HUSBAND

Little Daisy, All-in-One

MET a man who has solved the adequate wiring problem," I told Electra the other night.

"It's about time," she snorted. "You've lost enough sleep over that silly idea already. Wiring is just a nuisance anyway."

"Strange you should say that," I remarked. "That's what he said."

"It's my intuition," she snapped. "What else did he say that I could have told you all along?"

Then I went on to explain in detail. Yes, my inventor friend had hit it on the head. Wiring is a nuisance. Nobody really wants to sell it. Contractors try their hardest to give it away. Wholesalers do their best to help them. Manufacturers chip in with extra cuts and call it "advertising." The Edison Electric Institute wants to cheapen it still more. Utilities are interested in gas. So why bother with the stuff?

This is a land of great ideas, big bonanzas, Townsend plans, Epic plans, $30-every-Thursday, and nothing is impossible, not even "something for nothing." This inventor friend, probably over a bottle of Scotch, solved the wiring problem in just such a thrifty way. He calls it the "Little Daisy, All-in-One Service."

Cheap wiring that is cheap! In fact there is no wiring- Think what that would mean to the industry. Contractors could be retired to some pension scheme and make more money than they did while working. If any of them have not yet reached the required age, the worry they have endured will make them look eligible.

As for the utilities, my inventor friend thinks this plan more than meets all the requests of the Edison Electric Institute for revision of the National Electric Code—it eliminates the whole code at once.

A glance at the little diagram will aid in understanding the scheme. It is simplified to the extreme. In fact the draughtsman who drew it for him suspected him of being a bit simple too.

At the left of the house is the power company pole. We start there with a meter at the top of the pole. This will discourage current theft and completely eliminate the service entrance. Wires are brought nonchalantly to the house and stapled there. That's good enough. My friend points out that this is on the customer's side of the meter.

Down below the floor is the all-service main; really the water pipe. It has been said that someone wants to use water pipe for conduit, so here it is.

One wire is connected to the outside of the water main by means of a 15c ground clamp. The other is screwed to an old spark plug, inserted at the end. The pipe is used for one side of the circuit; the water for the return. If you use a.c. spark plugs you can alternate back and forth.

Instead of putting thin-wall insulation on the wire, do away with the wire entirely and spray insulation on the inside of the water pipe. Of course it will break down in spots, but that should be useful too. It will act as a means of heating the water, thus providing hot-water service day and night.

After all, the water should be hot, because there are 100 uses for hot water to ten for cold water. This would be no more inconvenient than wiring is now. For cold water, hot water will be brought up into the coils of the refrigerator and cooled off. This will make people buy refrigerators; that builds load. Notice the taps for the refrigerator motor. A nice refinement is incorporated here. Records show that most electrical fires come from overheated refrigerator motors. A sprinkler head is mounted above the motor. When the motor overheats the thermal plug melts, and water sprays the motor. Since one lead to the motor is connected to the thermal plug, the other to the pipe, this also disconnects the motor and does away with a switch or fuse. In fact this system does away with fuses, fustats, circuit breakers, everything.

Now since so many electrical men cook with gas, gas is bubbled into the water main. It rises as in a burp, makes a right-hand turn over the sink and comes down to the range. At the faucet is a degasifying filter. If there is any leakage, think nothing of it.

Waste disposal worried my friend at first. He wanted an all-service system or nothing, and it appeared as if it might be nothing until he tasted the water at Long Beach where the inspectors were given a preview of this system. "If Long Beach can get away with it, I can too," he said. However, for fussy people he provides a sterilamp right over the sink; but he recommends that the best solution is not to drink water. "What is California raising all these wine grapes for?" he asks. "Anyway, those who can't drink Scotch any more, are on a milk diet. So that takes care of everybody.

"Talk about use of waste space in conduit," he summarized. "This is use of waste space in water pipe; it is even better, it is waste in the water pipe, at still more saving. Gone are grounding problems. So is bare neutral.

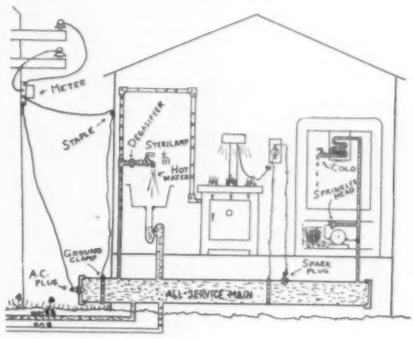
"No more wire, except by the utility, and bits of old cord here and there to outlets, such as that for the gas range light. The plumber puts in the pipe. He gets all the dough; takes it away from the electrical industry now. Might as well let him have the rest.

"No insulation, no service cable, no service switch."

"Maybe no electricity," I ventured.

"That's a risk the utility will have to take. The customer certainly takes his," my patent friend replied.

"There may be no customers, either," said Electra in that final and cold way of hers.



FRONT MEN

By W. T. TELLIGAN

YOU'VE heard of "front men"—those suave, polished diplomats of big business. Governments have them too—the Norman Davises and Anthony Edens. They're the fixers, the contact men, the real public-relations experts. In business or international politics, they smooth the ruffled tempers, assure the doubters, compromise with the belligerents and affirm friendships. They are the ambassadors of goodwill.

You know of another kind of "front men" in the electrical industry—the army of men and women who meet the public daily, mostly from behind the counters. They should be the fixers, the contact people, the real public-relations practitioners. They are the industry's potential ambassadors of goodwill. Unfortunately in too many instances, they unwittingly and unintentionally arouse ruffled tempers, create doubters, embitter the belligerent and break friendships. How do I know? I have been one of them—a cog in a machine run by interminable rules and red tape. From my place in another line of business, I can retrospectively review some of my experiences in the utility business and say to managers, "Examine the lot of your front men, if you would find the key to your public relations." I would urge them to listen in on the complaint, investigation and credit departments where they might hear the voices of Mr. Payne and Mrs. Peabody.

NOW neither of these two—Mr. Payne or Mrs. Peabody—wrote the book, but they know or think they know the answers to "How do utilities get that way?" Without prejudice, but solely by way of explanation, let me recite some personal observations and draw some clinical conclusions.

Mr. Payne (known as "Pete" to a great many substantial citizens who golf, drink cocktails, play poker and transact business with him) is a man of independent means.

One evening he went home to discover that the kitchen exhaust fan and electric refrigerator had undergone repairs at the hands of a service man from the utility. A checkup revealed that neither the cook nor Mrs. Payne had ordered any such service. Next month a $6 repair item appeared on the Payne electric bill. Mr. Payne called at the company's investigation counter for an explanation. He was friendly; merely curious.

A CLERK looked up the records; saw that a service truck had been to 2235 Columbine Ave., Mr. Payne's address; and that $6 worth of service had been rendered. So far as the clerk was concerned, that ended the matter. He said so.

Mr. Payne, slightly peeved, examined the record. "The name on this sheet," he pointed out, "is 'Gleaves.' Now I have a neighbor, at 2253 Columbine Ave., whose names is 'Deeds.' Perhaps a telephone operator got the order balled up. You'd better find out, because I certainly am not going to pay for service not needed and not requested."

He tried to pay his current bill minus the disputed item and the cashier refused his money. He went to the credit department and was referred back to the investigation department. Having been there once, Mr. Payne said, "Skip it," and went his way.

The following month, the $6 item again appeared, together with a 5% penalty for non-payment of the entire bill within the prescribed time limit. Thoroughly irked, Mr. Payne went back to the investigation department and had another session with the clerk. A near-riot occurred. Mr. Payne's voice grew loud and belligerent:

"I've already lost $10,000 in the alleged securities of this outfit's parent company; and I'll shoot another wad to fight this phoney service charge in court. So what?"

"Your service may be shut off," the clerk stated severely. "Your bill is more than a month in arrears now."

Fit to be tied, Mr. Payne lost control of his tongue and temper. "Just try it!" he yelled. "I'll expose your petty larceny graft before a judge and jury. I'll raise more kinds of hell than Dante ever saw." He left the building.

Finally convinced that here was a customer who felt he had been wronged, the investigation clerk checked back on the records—as he should have done in the first place. He found that Mr. Payne's guess was correct—that a Mr. Deeds at 2253 Columbine Ave. *had* ordered service for which Mr. Payne was billed. Having ferreted out the cause of a regrettable misunderstanding, the clerk let it drop. Not so Mr. Payne. He is still knocking the company; advising his friends, clients and anyone else who will listen, that all utilities are larcenists; that he has proof of it. His story gets better every time he tells it. He is an ardent advocate of all legislation that will make things tougher for utilities.

NOW, let's observe Mrs. Peabody. She is known as "Mother" to adult neighbors; as "Grandma" to the younger generation which loves her. She is an elderly, white-haired woman of refinement. At the credit desk she explained her embarrassment: She was on work relief. She was the sole support of two grandchildren who were suffering from flu. Due to one of the numerous mixups in relief administration, her government check had been delayed but would come next week. Would the company temporarily rescind a shutoff order, notice of which had been received that day? Mrs. Peabody would pay her bill next week. The clerk said he would take it up with the manager.

The following day a shutoff man disconnected Mrs. Peabody's electricity and gas while she was at work on a federal project and nobody home except her two sick wards. The old lady returned at night to find the children crying; with no means to light the house or cook a meal. In desperation she swallowed her pride and appealed to friends who quickly subscribed enough to pay her bill and have service resumed.

Sequel: Mrs. Peabody, the friends who helped in her emergency, their friends (many of whom are on relief) and so on in an endless chain, are busily engaged signing and circulating petitions which, if successful, will put the city in the electric business.

If you haven't already guessed the

Photo, courtesy of Pacific Telephone and Telegraph Co.

answer furnished by Mr. Payne's and Mrs. Peabody's experiences, here it is: Legislation hostile to utilities and movements looking toward public ownership of power plants has its origin in personal animosities built up in the companies themselves.

The remedy? Train the "front men" —those who meet and talk with the public—as diplomats are trained. The investigation and credit departments are the "Achilles' heels" of utilities. None but burnished, suave, convincing men or women should be there. This attitude that "the customer is always wrong" is too often displayed under the present regime. Customers are frequently wrong. They are often cranks who complain because they have nothing else to do. They are, in too many cases, "dead beats" who won't pay a bill until the pressure is applied. "Front men" should be selected who can distinguish between an honest citizen and a trouble-maker; who can handle a situation on its merits, and handle it *right*. But no hard-and-fast rule or set of regulations can apply.

Your reply is: "Such a person would rate an executive's salary." The answer is: "Such a person is worth an executive's salary."

The Mr. Paynes and Mrs. Peabodys have cost utilities millions of dollars. Capable "front men" would have cost thousands; they would have saved the difference.

THIS piece is not intended as an indictment of investigation, complaint, credit, contract or service departments. The thing goes deeper—to the *system* that lies behind these divisions. The various clerks are responsible to their respective department heads; the department heads answer to the chief clerk; the chief clerk reports to the company secretary; the company secretary to the president, general manager or other chief executive; ad infinitum. By following routine and causing no ripple in auditing, service, bookkeeping, new business and other departments, the investigation clerk simplifies his duties by convincing a customer that he is wrong and closing the incident as quickly as possible. The credit department employee, having orders from his boss that collections must be forthcoming—or else—, does his job without annoying his already-irked superior (who has probably had his ears knocked down by his superior). Consequence: An inhuman machine—geared for efficiency—that the public can rarely touch without getting hurt.

A famous fiction editor once said that the highest paid staff reader should be the person who first inspects manuscripts when they come into the office. Such a person has the making or breaking of magazine destinies in his hand—not through the tentative acceptance of sour material (which can always be thrown out) but through rejection of talent (which can never be remedied).

The average complaint or credit clerk corresponds to the lowly editorial assistant. In him is vested the responsibility of discriminating between truth and tripe. He can undermine or make brilliantly successful the efforts of public relations managers and chief executives by contacting customers in the wrong or right manner.

IS YOUR HOME
Adequately Wired
for
ADEQUATE WIRING SERVES AND SAVES
Comfort
Convenience
Economy
Ample Capacity
?
LIGHTING
Adequate Wiring with sufficient copper assures an even supply of electricity for correct lighting and eye comfort.
CLEANING
Adequate Wiring with sufficient copper provides enough convenience outlets for you to operate your cleaner in any room or hallway without disturbing other appliances.
COOKING
Adequate Wiring with sufficient copper provides for time-saving . . . effort-sparing electric cookery—in the kitchen or at the table.
LAUNDRY WORK
Adequate Wiring with sufficient copper provides a full measure of electricity for the efficient . . . economical operation of major appliances—washers, ironers, driers.
FUN
RADIO

Consumers Aren't Suckers

I'M ONLY an advertising man. I don't know much about adequate wiring. But I have friends who know a lot. They've told me what adequate wiring is. They've even tried to sell me an adequate-wiring installation. If my pocketbook holds out, I'll very possibly give in to their arguments. Why? Because what they've said makes sense. That's the one and only reason.

In a way, it hurts me to make such an admission. Because I'm in the advertising business I like to be sold by advertising. I'm a sucker for a good ad doing a good selling job. But believe me, I'm no sucker for bad advertising. Neither are the other 130 million inhabitants of these United States.

All of which may seem rambling. But it does lay the ground for my contention:

I see newspapers from all over the West—that's part of my job after all. I've studied the advertising in those newspapers. And I've come to one conclusion: The contractors and dealers and electrical leagues and utilities who advertise adequate wiring are not doing a job.

I can say this because, besides being an advertising man, I'm a consumer. And as a consumer, I'm not being sold. I look at these adequate wiring ads and one question invariably pops into my mind: "Just what the hell is adequate wiring?"

Enough wiring. Sufficient wiring. Capable wiring . . . . That's plain enough. At least it is to me. (Though I'll lay odds there are many people who don't know what "adequate" means.)

But ignoring this point, I come to another. You contractors and dealers and electrical leagues and utilities say that adequate wiring will bring me comfort, convenience, economy, etc. Which is fine. But, I ask, "How will it bring me these things? Why will it bring me these things? How does adequate wiring work?"

Well, I know the answer. Chalk that up to the tireless efforts of my electrical-industry acquaintances who've cajoled me into understanding. But again I refuse to give a speck of credit to your advertising.

Today, people are beset by so many companies trying to sell them something that they've built up a resistance against salesmanship. We're coming of age, we consumers. We refuse to believe what you say is true just because you or Mr. Roosevelt say it's true. We want to know why it's true. What's your proof?

TO DATE I have yet to see an advertisement for A-W which gives me that proof. Let's take an example—the ad appearing on this page.

"Is Your Home Adequately Wired for Comfort, Convenience, Economy . . . ?" That's swell. I look at that headline and I stop to wonder. But what's that fourth advantage point, "Ample Capacity?"

Sure, a barrel has ample capacity. A fat man has ample capacity. But how can a wire have ample capacity? No electrical wire I ever saw was hollow. So how can it have ample capacity?

Search me.

To get on with my argument, however: Here are some things—lighting, cooking, etc.—which adequate wiring will make better. I'm still interested.

But what's this? "Adequate Wiring with sufficient copper assures an even supply of electricity for correct lighting and eye comfort."

What is this "sufficient copper" these birds are talking about? Why if you put any more wires in a light cord, the cord would swell up like a puff adder. And who wants a puff adder in his home?

Gentlemen, you've got me.

I don't understand you. You're talking in the language of the electrical industry, not in that of John Smith. You say "convenience outlets" when I say "floor plugs." You say "copper" when I say "wire."

AND, above all, you haven't answered my questions: "How will adequate wiring bring me comfort, convenience, etc.? Why will it bring me these things?" You've told me that I need adequate wiring. But you haven't proved your statement. And I demand proof. *Proof.* PROOF.

Stepping out of my consumer shoes into my advertising-man shoes, therefore, I offer one suggestion:

When you write an advertisement aimed at interesting consumers in the adequate wiring of their homes, give them at least one sentence—one little sentence—answering their why's and how's. "Adequate Wiring will bring you comfort and convenience because it assures you enough floor plugs to which you can attach your lamps, toaster, vacuum cleaner."

That's all you need. Though of course it wouldn't hurt to go two or three sentences deeper into the subject. "Adequate Wiring means the installation of larger wires in your home. Larger wires mean that you will get all the juice you pay for and that fuses, strained in the past by too many appliances feeding off smaller wires with fewer floor plugs, can no longer blow out."

In this way you will make your ad stronger. The person who reads it will have all the facts necessary for him to form an opinion and ask himself a question—"Shall I ask these boys for more dope about adequate wiring?"

We consumers are not suckers, gentlemen of the electrical industry. You're the suckers for believing that large type and larger space are all you need to sell adequate wiring.

Rubber for Ruggedness

Need of mechanical flexibility and resistance to electrolysis leads to use of rubber-jacketed cable to serve heavy load at 12 kv.

By A. W. Flippin and C. R. Machen

NEXT year, the Golden Gate International Exposition on Treasure Island, in San Francisco Bay, will require 20,000 kva. Finding an economical means of making that capacity available was the task of Pacific Gas and Electric Co. in 1938. Furthermore, service had to be so planned that 10,000 kva. would be permanently available to the San Francisco-Oakland Bay Bridge railways and so that capacity which will be released upon termination of the World's Fair can be utilized to transmit hydro energy via submarine cable from Oakland to San Francisco.

The only point on the PG & E system from which it was feasible to supply this block of load was steam Station C, at First and Grove Sts., Oakland. Capacity at Station C (upon completion of a 50,000-kva. unit now going in) will be 120,875 kva. of steam plus 60,000 kva. of hydro which enters by way of a 120-kv. cable. In addition, eight 12-kv. ties accommodate a combined capacity of 50,000 kva.

Service, therefore, had to be carried from Station C across roughly 2½ mi. of city and along 2 mi. of earth fill to the pier substation from which point it is fed to the railways and departs by submarine cable to the Island.

It was along the fill, especially, that unusual obstacles demanded new techniques. The fill is new, so a satisfactory underground must allow for settling. Both soil and sub-surface water are highly corrosive, a factor which the circuits must be able to withstand.

These conditions led to the selection of single-conductor, rubber-covered cable and to one of the largest installations of this type of cable at 12 kv.

Three circuits were installed, each with a capacity of 9,000 kva. Throughout the first 12,500 ft. from Station C to 22d and Wood Sts., lead cable was employed and was pulled into a 6-way, 4½-in. soapstone duct line. Each circuit consists of three 750,000-circ. mil, single-conductor, 15-kv., 13/64-in. wood-pulp paper insulation, 7/64-in. lead sheath, compact stranded cables, a complete circuit of three cables being carried in a single duct. Manholes are 5 x 7-ft. transmission type, and the longest cable section is 660 ft.

The three cables for each section of a circuit were purchased on one reel, permitting them to be pulled simultaneously in the same duct. This procedure considerably reduced the time and cost of cable pulling. It was necessary to handle but one reel where three would normally be employed. Cable reeled in this manner becomes unwieldy only when sections are excessively long.

It is important, however, that the manufacturer keep all three cables on the same layer, filling the space between the reel flange and cable with paper. If, in reeling, one of the three cables drops to a lower layer than the others unevenness develops, difficulties are encountered in feeding into the duct mouth, and the possibilities of wedging and damaging multiply.

Average pulling tension on the 580-660-ft. sections was 3,400 lb. Thousand-

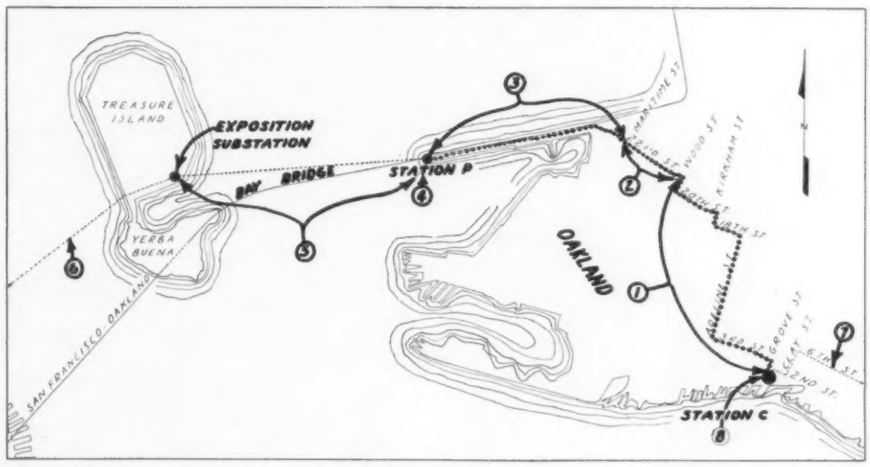


Fig. 1—Map of area served by the 12-kv. underground: (1) traversed by lead cables in 4½-in. soapstone ducts; (2) no duct line, rubber-covered cables are direct buried, each of three circuits in separate trench; (3) rubber cable continued but carried in 5-in. Transite duct; (4) Station P serves as the terminus of sections described herewith, it accommodates 8,500 kw. in mercury-arc rectifier capacity which serves the bridge railway; (5) three 500,000-circ. mil, 3-conductor submarine cables carry the exposition load from Station P to Treasure Island, the fair site; (6) this 250,000-circ.mil cable to San Francisco serves as stand-by; (7) a 120-kv. oil-filled cable feeds 75,000 kva. into Station C; (8) at Station C is 100,000 kva. in steam generating capacity now installed

foot runs undoubtedly could be installed without difficulty if duct and manhole construction were supervised with an eye toward that end.

Single Conductor Used

Single-conductor were preferred to three-conductor cables because of cost —single affords shielding without extra cost—and because of higher current carrying capacity, a result of better heat radiation.

This last advantage is somewhat offset by the sheath currents which are induced. However, cross-bonding was employed in every manhole to keep sheath potentials at a minimum.

Individual 3 x 17-in. lead sleeves were used for splicing, cable ends being prepared in the conventional manner and connected together by a compressed copper sleeve, which is a speedier process than soldering a split sleeve. A thin wrapping of tinned copper was employed to cover the press indentations.

After the copper sleeve was compressed and wrapped with copper, insulation was built up with black varnished cambric tape to about 2½-in. max. diam. The lead sleeve was then wiped in place and filled with compound.

The three cables of each circuit were individually fire-proofed with asbestos tape and silicate of soda and then firmly tied together to secure them against repulsion from fault current.

Rubber Installed

Beyond 22d and Wood Sts., throughout the remaining 11,700 ft., rubber-insulated, rubber-jacketed cable was employed. Militating against the use of leaded cable were stray-current electrolysis from the paralleling electric railways and the corrosive character of the ground. The possibility of using paper-insulated, lead-covered, rubber-jacketed cable was considered but dismissed because of the added cost and weight, and the fact that such an installation would require larger ducts.

This cable, likewise single-conductor, 750,000-circ. mil, shielded, carries an insulating rubber of the so-called oil-base compound type, 16/64-in. thick. The rubber jacket is composed of a tough, abrasion-resistant rubber compound, 10/64 in. thick. The copper shielding lies between the insulating rubber and the jacket. Manufacturers claim it will withstand temperatures up to 75 deg. C.

Like the lead cable, the rubber conductor was purchased with three cables wrapped parallel on one reel, except for a few of the longer sections. Again it was found that this method of pulling proved easier and more economical.

The rubber installation consists of two parts: the first 2,600 ft. from 22d and Wood Sts. to Maritime Way, where the cables are buried directly in the ground; and the remainder of the distance to the pier substation, where the cable was installed in Transite conduit.

Direct Burial

Throughout the first part was a sandy swamp, where water was encountered at depths of 18 to 24 in. Here the cost of manhole and conduit construction would have been prohibitive so three individual ditches were dug by means of a ditching machine which was run on plank. The ditches were 18 in. deep and 4 ft. apart. The three cables of a circuit were placed flat in the bottom of each ditch and spaced for maximum separation. The cables were installed in two sections with buried splices at the junctions.

Over the second part, only a narrow strip of right-of-way could be obtained. Overhead was not consistent with the plan for bridge approaches. Direct burial was out of the question because circuits would have had to be laid one

Fig. 2 (above)—Trench digging under way for the duct line running along the fill which leads to the bridge. It was desired to keep this section free of overhead, and insufficient right-of-way was available to permit direct burial. Fig. 3 (right)—Lead cables being pulled three at a time. Notice at right of reel that all three cables drop to the next layer simultaneously. Fig. 4 (bottom of opposite page) Rubber cable splices completed and tied to brackets in manhole. Cables rest on porcelain blocks which fit over the bars. The taps connect cable shields to the ground rods

over another and because, once buried, they could not be dug up.

Soft sandy soil indicated the possibility of settling and the desirability of light weight. Because its strength would permit installation without a concrete envelope, Transite conduit (5-in.) was selected for this job. Ducts were laid two wide and three deep, one being employed for a telephone cable and two being spares. At manholes, which are 5 x 7-ft. transmission type with a maximum spacing of 500 ft., two ground rods were installed for grounding the shielding tape of each cable section. Flexibility was provided in the duct lines by inserting rubber rings at the joints of the duct lengths.

Pulling Rubber

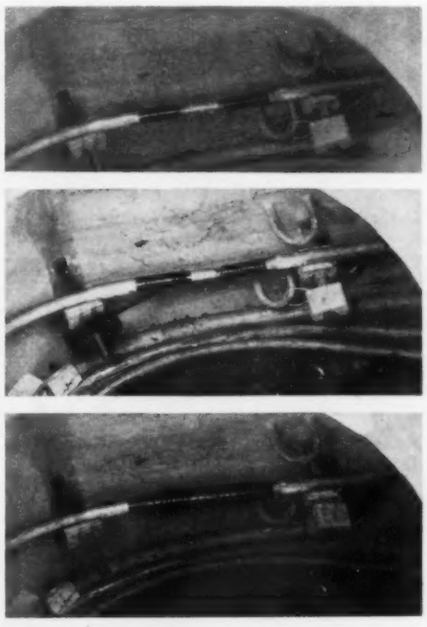
In pulling the rubber cables, water was at first used as a lubricant, but pulling tensions ran as high as 4,000 lb. On the remainder of the job, a considerable reduction in tensions was achieved by lubricating with a jelly prepared from a good grade of soap chips. The cable was bought with pulling eyes attached firmly to the ends of each conductor, no pulling baskets being used.

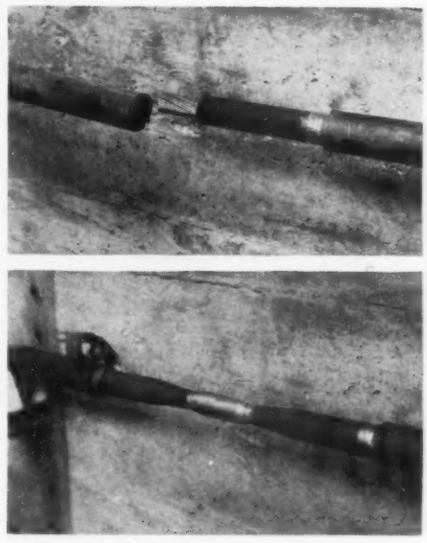
Rubber Splices

Splices between the rubber cables were made by using a combination of oil-base-compound insulating tape, high-grade-rubber tape and high-grade friction tape. The ground shield was broken at each splice in order to minimize induced shield currents and was grounded at only one end of each section.

A step in making a rubber to rubber splice is shown in Fig. 5. The method of splicing was as follows:

After the cable was positioned so the ends butted properly, the outer jacket was removed for a distance of 9 in. from the cable end, and the shielding tape was unwound (not cut off) to within 1 in. of this mark. This permitted removal of 2¼ in. of insulation from each conductor end so that the connector could be pressed in place and covered with its wrapping of copper sheet. After receiving a coat of rubber cement, the copper sheet was wrapped with a layer of insulating tape. Next the insulation was pencilled back for a distance of 2 in. and the rubber jacket for 1 in., the pencilled sections being smoothed with a rasp or mineral cloth. Pencilled surfaces, insulation and insulating tape over the connector were then coated with rubber cement, which was allowed to become tacky before the process of building up the insulation to 2-in. diam. was begun, using oil-base insulating tape, half-lapped. As this tape was laid, every second layer was rolled down with a heated roller, to assure firm adhesion.





A layer of half-lapped friction tape was next applied, starting at the end of the shielding tape on one end and carrying to within 1 in. of the pencilled jacket. This was covered with a layer of half-lapped tinfoil which was soldered to the shielding tape at one end and carried across the joint to within 1 in. of the end of the friction tape. Another layer of friction tape followed. A No. 4 ground wire was then soldered to the unwrapped shielding tape, which was then rewrapped over the joint. Another layer of friction tape was applied next, followed by half-lapped standard rubber tape over the entire joint, extending 2 in. back over the jacket and up to a diam. of 2 7/16 in. Roughening the bond and applying rubber cement were found necessary to obtaining a food bond between jacket and rubber tape. Completing the splice were two layers of half-lapped friction tape and two coats of insulating varnish.

The ground wire was then connected to the ground rod lead. The ground shield on one section is insulated from that on the next, but the entire splice is protected with shielding.

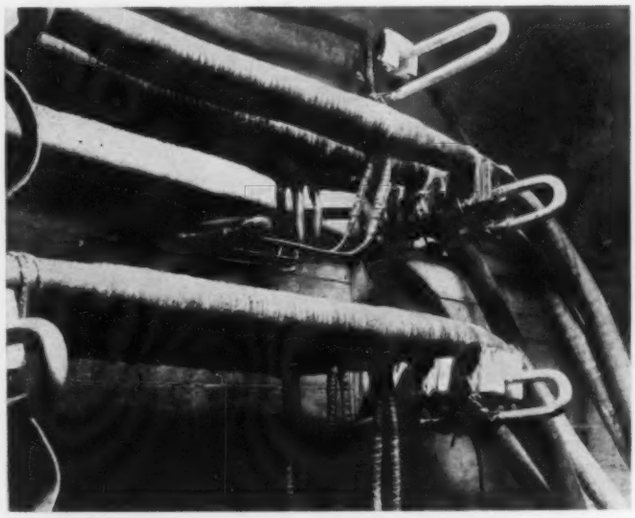


Fig. 5 (top of page) Steps in splicing the rubber cable. In upper view, cables have been positioned, and jacket, shield and insulation have been stripped from the one at right. In the lower view, conductors have been connected and insulation is pencilled back, ready for taping. Unwound shield can be seen at left, ready for rewinding. Fig. 6 (above)—Steps in splicing lead cable. In the third view tape insulation has been built up to thickness and splice is ready for lead sleeve

Lead-to-Rubber Splice

Where it was necessary to make a splice between the paper-insulated, lead-covered cable and the rubber-insulated, rubber-covered cable, a special lead sleeve with a layer of rubber molded on one end was used. This sleeve was supplied the cable manufacturer, and the joint was prepared as follows:

Cables were positioned so ends would butt. The lead sheath was prepared for wiping and the lead removed a distance of 7⅞ in. from the end of the con-

ductor. The rubber jacket was removed a distance of 8⅝ in. from the end of the conductor and the sleeve slipped over the rubber cable, rubber end first.

Insulation was removed for 2¼ in. from the ends of the conductors, connectors were slipped on and pressed into place. Insulation pencilled for 2 in. on the rubber cable, ⅞ in. on the paper. The copper sheet was placed over the connector and held with varnished-silk tape. Connector, conductor and insulation surfaces were then coated with insulating varnish, which was allowed to dry tacky. Over this, a layer of varnished-silk tape was half-lapped and painted with insulating varnish. This tape-varnish application was repeated, thus forming a seal to prevent migration of oil into the rubber insulation. Varnished-cambric tape was then employed to build up insulation over the connector to 2-in. diam.

Shielding Braid

Next, a copper band was slipped under the lead sheath and a layer of mesh, shielding braid placed over the joint, soldered to the copper band, and carried over the original shielding tape on the rubber cable.

The sleeve was then slipped in place and wiped to the lead cable. The moisture seal was made between the rubber-tipped lead sheath and the rubber jacket by using rubber cement, rubber tape, friction tape and insulating varnish, a process similar to that employed in the rubber to rubber joint. Last, the sleeve was filled with insulating compound and sealed.

Proves Endurance

A demonstration of the physical ruggedness of the rubber cable occurred when a pile was driven inadvertently through the middle of the right of way. It pushed aside two of the circuits with sufficient force to break the conduit, but none of the circuit cables was damaged.

The first 56,000 ft. of rubber cable for this job was furnished by Okonite. A similar order went to General Electric. Furnishing lead cable were Habirshaw, Anaconda, and General Cable. P G & E made the installation, except for conduit and manhole construction which was undertaken by contractors.

This installation is illustrative of the trend toward use of rubber covered cable and demonstrates an instance in which its higher first cost is offset by its physical endurance. Rubber cable's adaptability to direct burial, its probable longer life, and its superiority in instances where electrolysis or expansion and contraction are to be met are factors which point towards continuation of the trend.

Edison Rebuilds Hydro

Ten flood-damaged plants restored

ON THE east end of the Southern California Edison system is a string of twelve base hydro plants situated in the foothills of the Sierra Madre Range which, in the past, attracted attention chiefly because of the fact that they are among the first hydro-electric plants constructed in California, and also because of the fact that in spite of their age they have been kept in operating condition and have furnished kilowatt hours to the system in a most economical manner. Being thus of historical significance, the group roughly known as the east end hydro plants attracted what many considered to be obituary notices last March when devastating floods wreaked havoc with every last one of them.

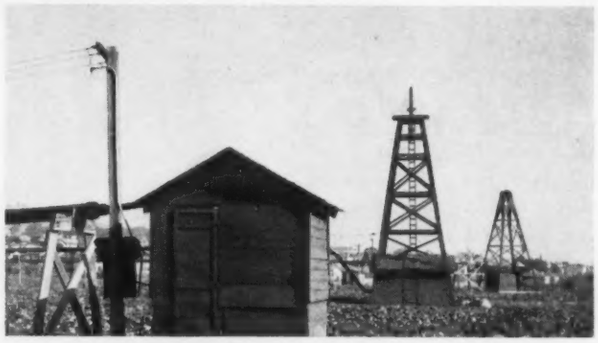
Some engineers, therefore, may be surprised to learn that all but two of the smallest of these plants have again come to life. Edison's reason for resurrecting them was not sentimental. All but the Ontario No. 2 plant and the Sierra plant situated in the San Antonio Canyon have been rehabilitated because the 14,300 kw. of generating capacity installed in the ten plants could thus be restored in an improved condition to the Edison system at less than $8.00 per kilowatt of capacity.

The plants affected by the flood were:

3 in the Santa Ana Canyon	6,900 kw.
3 in the Mill Creek Canyon	3,850 kw.
2 in the Lytle Creek Canyon	2,400 kw.
4 in the San Antonio Canyon	2,350 kw.

Rebuilding, which began when the flood waters abated, continued throughout the fall, and was carried on under the direct supervision of G. Clingwald, Superintendent of the Edison Southern Hydro Division. Apparent to Clingwald was the fact that if the plants were to be economically rebuilt, mechanized equipment would have to be employed to open the locations to vehicular traffic. Hence, the first job was one of road building. Over six miles of private road had been washed out and had to be repaired before men and equipment could reach the various jobs. Shovels and bulldozers which had just been returned to the warehouse from the Boulder-Chino line construction were immediately put to use on this job, and approximately $10,000 was spent on this phase of the work. Where plants were located on county and state

Mud and debris on the floor of Edison's No. 2 Santa Ana plant are typical of conditions which faced reconstruction crews after disastrous floods last March



Above are three of the wells where induction motors are served 3-phase, 440 volts. Below, 120 kva. of 4,000-volt capacitors fit into small space by transformer

highways, the work of rebuilding the roads was done by public forces.

Here are samples of the work which awaited Edison crews once transportation facilities were established to the plants:

Santa Ana Canyon: Rebuild intake dam; replace concrete flume and steel siphons; remove mud and debris from all power houses; dry out electrical equipment; replace miscellaneous small motors, cable, relays, instruments, etc.

Mill Creek: Rebuild intake structures for No. 2-3 power house; replace 2000 feet of steel penstock; replace 500 feet of steel siphon.

Conditions similar to the above were encountered also in the Lytle Creek and San Antonio canyons.

The Lytle Creek plants were the first to go back on the line, May 26th. The last of the Santa Ana plants was in service by June 20th. Those at Mill Creek were in service by June 28th, and two of the four San Antonio Canyon plants were in service by August 15th.

According to J. F. Davenport, superintendent of generation, by the end of November final clean-up of the storm damage had been completed, and the plants at all locations are better equipped to withstand flood conditions as a result of the protective work that has been accomplished since the last of the plants was put on the line during the summer. At the present time engineering studies are being made to determine the most economical manner of rehabilitating the two uppermost plants in the San Antonio Canyon which are still out of service. The expense involved in the rehabilitation of these two plants will considerably exceed the cost per kilowatt of restoration of the ten plants that were badly damaged but now in service.

The total cost of rehabilitating the ten plants for work done to date, including all road work, protective work, and capital improvements approximates $120,000.

Capacitors Cut Pumping Cost

Return 31% on investment

A CAPACITOR installation which for several years has been earning a substantial return on investment, has already paid for itself and is now giving an industrial customer substantial savings on his annual energy costs affords an excellent example of the benefits derived by an industrial through power factor correction.

Such an installation is the one for the California Water Service Co. in South San Francisco. Water Service operates twenty-odd plants throughout California. The one at South San Francisco serves several important industrial plants as well as the domestic load for that city. Its operation consists of pumping from wells into reservoirs.

On this and the following page are instances in which an industrial power customer and a central station system show economies as the result of capacitor installations. These exemplify points in the article, "CKVA", by C. R. Benson, in October and November issues of Electrical West.

Maximum demand at the Commercial and Chestnut Sts. pumping plant approximates 250 kw. In operation are three 15-hp., three 30-hp., two 50-hp. and two 150-hp. induction motors operating pumps. Except the 150-hp. units, which operate alternately, most of the pumps run continuously. Thus load factor is high. Monthly power consumption runs 112,000 to 176,000 kw.-hr.

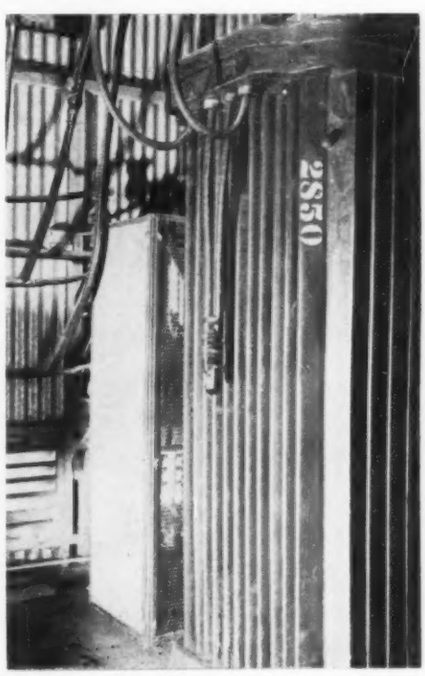
Prior to installation of capacitors, power factor approximated 82 per cent. Energy is served by Pacific Gas and Electric Co. on a P-30 schedule, which contains a power factor clause. This states that, within certain limits, the total power bill shall be increased or decreased by ¼ of 1 per cent for each 1 per cent by which the power factor is less or greater than 85 per cent. The power factor is determined by readings of kw.-hr. and rkva.-hr. with the rkva.-hr. meter ratcheted so that the customer has nothing to gain in his energy rate by correcting beyond 100 per cent power factor. It was thus apparent that by installation of capacitors, Water Service Co. could realize savings on its energy charges amounting to ¼ of 100-82 per cent, or 4½ per cent.

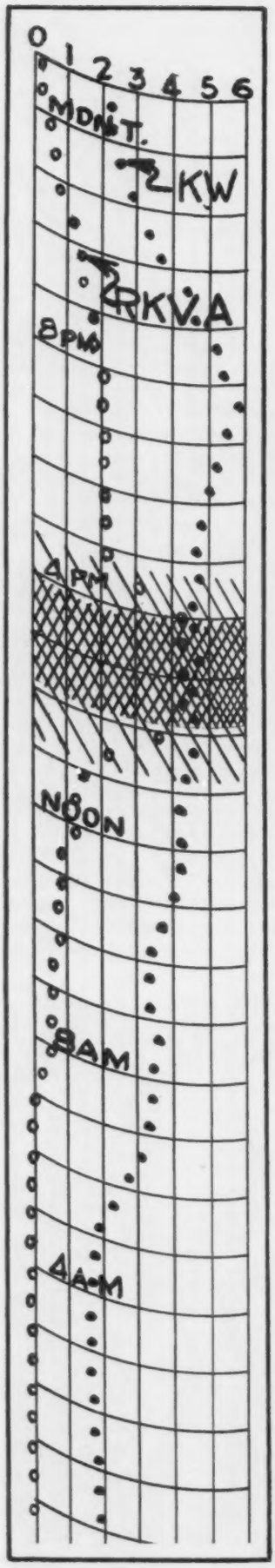
Energy is delivered and metered at 4,000 volts. It is then stepped down through the customer's transformers and distributed three-phase, 440 volts to the pumping station and the pumps at the wells.

Inasmuch as no substantial increases in load were anticipated and as the transformers were overloaded, the location of capacitors for the release of transformer capacity was not considered important. It was, moreover, more economical to purchase capacitors in 4,000-volt ratings.

Hence, with the single objective of correcting power factor, 120 kva. of capacitors were purchased, in 4,000-volt, 15-kva. units, mounted together in a single rack. The installed cost was $1,478.

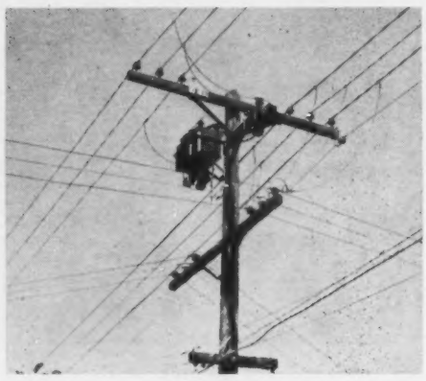
That was in 1934. Since then, the customer has been calculating his average annual savings from this installation at $475. This represents an annual return on the capacitor investment of slightly over 31 per cent.





P. F. Correction for Small-Motor Load

By C. N. Parker



PEAK load in September has become a typical characteristic of many arid regions. The cause of this shifting of peak has, in many cases, been the desert cooler. Often constructed of antiquated motors, fans, bailing wire and some alfalfa, desert coolers have become so concentrated in certain distribution areas that peak loads of exceedingly poor power factor are encountered at the very time when high ambient temperatures make equipment least capable of handling it.

Such has been the case in Mojave and Colorado deserts, particularly in the Imperial, Coachella and Palo Verde valleys. In these areas, Nevada California Electric Corp. has found that an economical way of releasing capacity is to install capacitors.

In El Centro, for example, serious overloading was found to have developed rather suddenly on four 2,400-volt lighting circuits. Investigation disclosed that numerous desert coolers had been added to these lines, and that many of them were powered by motors having power factors of but 47 to 60%. Tests on the lines themselves, in September, showed average power factor for a 90-hour period to be 56% on the lowest line and 78.5% on the highest.

Distribution of load along the lines was determined from both kva. and split-core ammeter readings, annual kw.-hr. and rkva.-hr. curves being plotted for the circuits. Reactive kva. were found to rise steadily from April to June, and on one day in September, rkva. exceeded kw. for the entire 24 hours. The load curve followed the temperature curve.

These data indicated the advisability of installing capacitors. The amount installed, 720 kva., was governed by the amount of capacity it was desired to release plus the fact that the power factor was low for but four months of the year. The endeavor was to avoid, insofar as possible, having idle capacitance on the lines for eight months each year. The 720 kva. is only a little more than the January average of reactive kva.

The capacitors (2,300-volt, pole-mounted) were distributed along the circuits about in the ratio of 15 ckva. to 75 transformer kva. Excess capacitance was located toward the end of the line to improve voltage. Much of the load on the four circuits occurred on single-phase branches. Hence, 405 of the 720 ckva. was installed in single-phase units.

To justify the cost of these capacitors, it is necessary to consider only the release of synchronous-condenser capacity. During peak loads, two synchronous condensers were loaded to the limit to maintain voltage for the unregulated circuits. Synchronous condensers are worth about $11 per kva. The capacitors cost but $8.70 per kva., installed.

But to go further, previous to installation, cables, regulators, etc., on one of the lighting circuits were overloaded to the point where it was necessary to parallel a spare cable during peak. When the capacitors were installed, current on this 2,400-volt circuit was reduced from 225 to 190 amp., permitting release of the spare. The capacitors thus saved the cost of an additional cable.

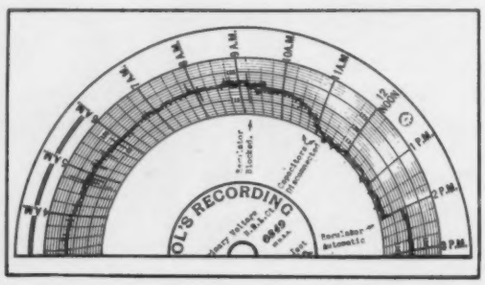
Harmonic tests, made by placing 3d, 5th, 25th, 27th and higher harmonics on the lines with from 5 to 16 volts, showed no increase in capacitor current on a recording ammeter. Tests by the telephone company showed a slight decrease in noise with capacitors connected in delta, particularly in higher and more harmful harmonics.

Nevada-California feels that the capacitors have brought about results that were hoped for and entirely justified the investment.

Left—In this chart time progresses from bottom to top, readings being taken at the substation on a combined residential-rural line serving Northwest El Centro. The constant is 1,200. The shaded area is the time during which capacitors were disconnected, while the partially shaded areas cover periods during which capacitors were being cut in and out

Right—Voltage (constant is 20) 17,000 ft. from substation on a 3-phase feeder made up of 5,500 ft. of No. 1/0, 1,100 ft. of No. 2, and 10,400 ft. of No. 4

At top—A 3-phase bank of capacitors, 45 kva. Half of the total installed were G. E., half Westinghouse



Functional Meter Plant

WHEN San Diego Consolidated Gas & Electric Co. moved its meter department into new quarters, it capitalized on the opportunity to create a plant which would minimize waste motion, segregate activities and provide the best working conditions for personnel.

When it completes installation of equipment in the laboratory room, it will have a physical set up which might well serve as a model for systems of similar size. Details have been worked out under the direction of W. H. Talbott, department superintendent.

The building, half of it new, half rebuilt from an old gas laboratory building, measures 44x96 ft. This represents a floor area of 4,470 sq. ft. plus 1,100 sq. ft. of basement.

Part of this area is a platform, which runs the length of the rear face of the building and is surmounted by a marquee. Here trucks, thus protected against rain, load and unload equipment. Repair, store and test rooms, to and from which equipment ordinarily is moved, open directly on the platform. Instrument room, shower room and laboratory are contiguous with these, thus keeping the working areas united, while offices are grouped toward a front corner of the building.

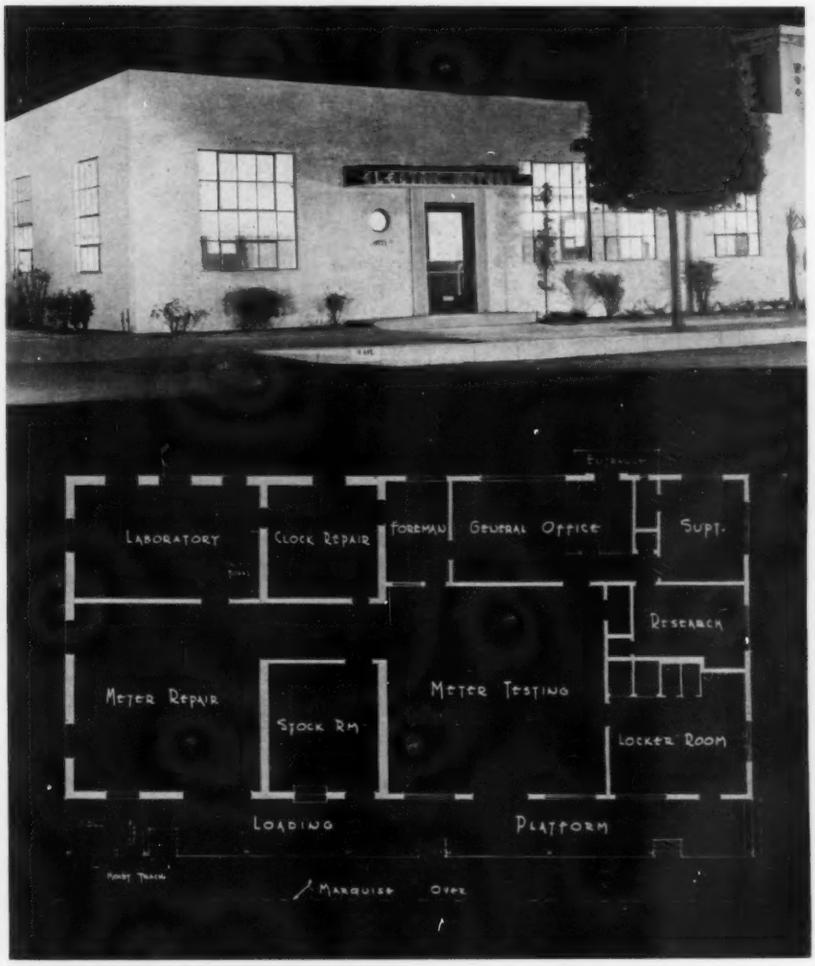
Building appointments and equipment were selected for their contribution to the department's efficiency, rather than for cost. Any item which would materially improve the performance of a department doing skilled, precision work on valuable equipment would, it was felt, represent the greatest long-run economy.

Storage shelves, work benches, etc., are of steel. Mobile leaders are used in conjunction with storage shelves.

Floors in the work areas are of 2½-in. wood block laid on ¼-in. mastic. Offices are floored with colored asphalt tile.

The arrangement of rooms is intended to preserve one-way motion of equipment within the building. Returned meters, for example, are unloaded directly to the repair shop. Meters to be retired are segregated and stored there, thus preventing the possibility of their return to service. After check tests, restorable equipment is cleaned, repaired, converted to socket type and then moved to the test department where, after final test and adjustment, it is stored until needed for further use.

One year finds 130,000 work orders cleared through the department. In some phases of this work, the new plant has been responsible for 30-per-cent savings in time. To all work it has contributed immeasurable improvements in accuracy, efficiency and morale.



Top—Front of the San Diego meter building and the floor plan which facilitates handling. Below—Section of the test room. Twelve 300-watt fixtures augment the skylights. Hand-truck and table are surfaced with rubber, and, like storage shelves, are built of steel

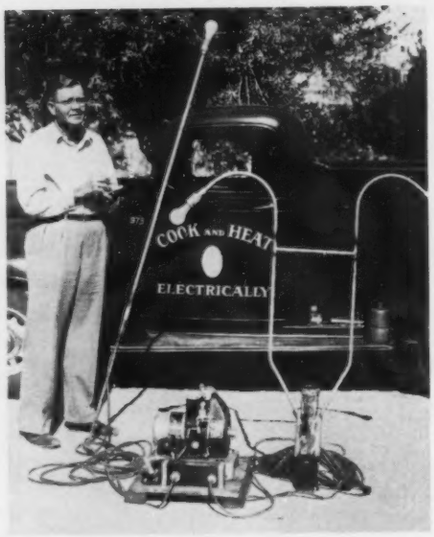
Night Work

Enables Nev-Cal to reinsulate line during off-peak

Because the line had to be in service during peak loads, Nevada-California Electric Corp., in rebuilding a 50-mi. section of its 288-mi. San Bernardino-Bishop transmission loop, adopted a schedule of night work. By carefully planning the schedule and by originating equipment for adequately lighting the poles, Nev.-Cal. engineers succeeded in providing construction crews with the means of working almost as fast by dark as by day.

The job comprised replacing pin-type with suspension insulators and wooden crossarms and ridge pins with steel, wish-bone arms. The 11 p.m. to 7 a.m. week night and 8 a.m. to 5 p.m. Sunday schedule afforded a comparison of night and day performances. Records show that a 12-man crew and foreman could change 16 poles per 8-hr. night shift, 20 poles per 8-hr. day shift.

To light the pole top, a fixture carrying two bulbs was designed to slip over the abandoned ridge pin. To light the ground, a fixture was mounted on a steel stake, which could be moved about and stuck into the earth. Portable generator plants, weighing but 60 lb. and rated 300 watts, were found to be an economical source of energy, one being used to each 55-ft. pole. With this equipment, only the untying of the ridge wire and removing of the ridge insulator had to be done in darkness.



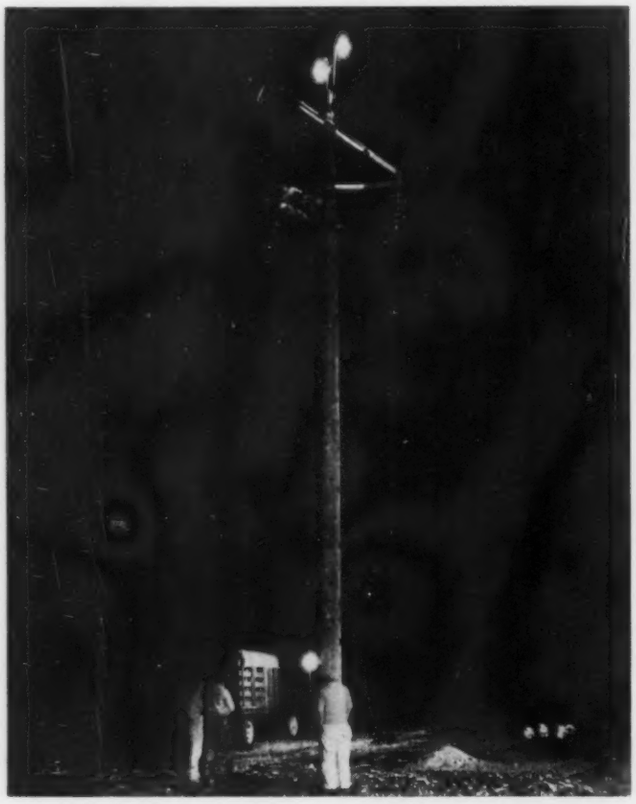
B. O. Mitchell, director of construction in Imperial Valley, displays the fixtures he designed. Generator set shown in foreground and light-weight truck equipped with sand tires in background

Delivery and partial assembly of equipment at the poles was, at first, performed by a 2-man day crew, but this procedure subsequently was abandoned because it was found that groundmen on the night crews had both sufficient time and sufficient light to do the work while linemen were making ready.

Portable telephones were connected by duplex to a nearby operating line, and foremen were held responsible for maintaining contact with the load dispatcher. Transportation was facilitated by using light trucks. Line trucks were left at the job while men travelled to and from in fast station wagons.

Forty men worked on the job, completed it in 25 days.

Linemen place suspension insulator by light of fixture slipped over ridge pin. Ground light is just to left of pole, generator at extreme left. Hand line is attached to hook on pole fixture



Not Plotted

Meet the San Francisco Section, AIEE. The best time to do this is Tuesday noon. Any Tuesday at 12:15, on the 15th floor of the Insurance Center Building in downtown San Francisco. That's the Engineers' Club, where the Section meets for lunch.

You get off the elevator at the 14th floor, poke your head in the door of the Club game room to see who's playing bridge or dominoes, then check your hat. Next you walk in the lounge to see who's standing around that you know and find that nobody is and, looking at your watch, discover the reason: it's 12:16.

So you start upstairs but, because it's a clear day, find that you have to pause there and stick your head over the shoulders of Frank Angle (Allis Chalmers) and Don Cone (P.T. & T.) and look out at the blue bay. There's a faint haze. The city lies toward the right, and the bridge arches in two slim spans to Goat Island, to the left of which next year's World Fair rises out of the blue water like a magic city of gold.

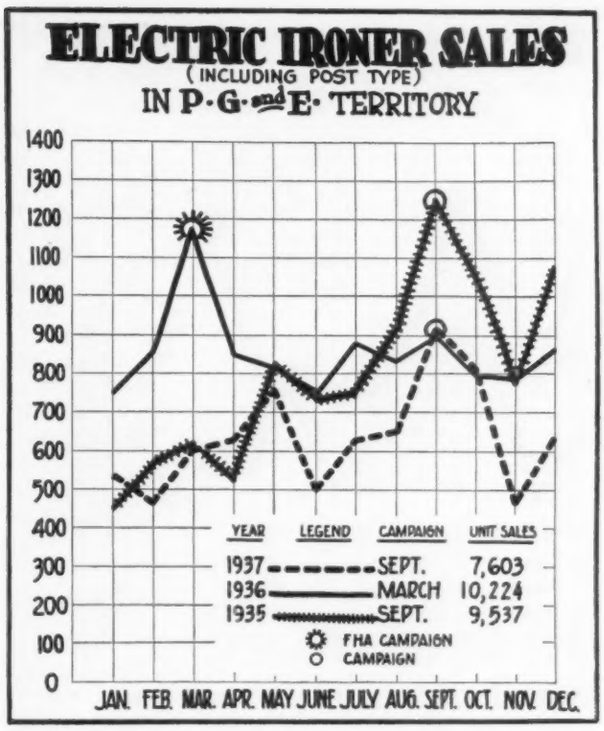
But your stomach moves you on up to a large dining room where perhaps 50 men, many of them strangers, are lunching at tables for four or six. But at your right is a long table with about 25 familiar faces ranged along its sides from the head toward the foot, about half filling it. F. S. Benson (P.G. & E.), Section chairman, is seated at its head, and looks over his shoulder at you and says hello.

You take a seat and order something like smoked baked cod, or deer-foot sausage, and throw in your vote with the 75% who invariably have a chocolate sundae for dessert. By the time you're half through lunch there are 50 filling the table and more looking for seats somewhere else. Lunch costs 60c.

Somebody says that USC should go to the Rose Bowl and you flatly declare that the Bears are still the best team in the conference. Somebody else says that Chamberlain's policy is the outgrowth of great genius, and two others condemn him to be shot. So your lunch is eaten with relish in an atmosphere of congenial disagreement. Toward the end a mild confusion breaks out as Sam Russell (Squires Co.) and Clive Baugh (P.G. & E.) attempt to assemble two foursomes for bridge. You decline with the terse comment that some people have to work part of the time.

Afterward, on the sidewalk, you remember that you were going to speak to so-and-so about that transformer. Oh well, you'll see him there next week.

Smoothing the Kinks Out of Ironer Sales



WHY not get as much ironer business as washer business? Worth thinking about, certainly, for ironers have not set the world afire in sales. With washer saturation high, and a good replacement market, why has it been so hard to sell ironers when every washer owner should have one? The answer to these questions should mean money to the dealer and salesman, volume to the manufacturer and load for the utility.

San Jose, Calif., was selected by the Electric Appliance Society of Northern California as a live and cooperative city in which to ferret out the truth about these questions. With the campaign entering its final stages, there is reason to believe that the answer, or at least a part of the answer, will be found. Yet to understand the answer, it is necessary to investigate the problem. Bert W. Reynolds, of Pacific Gas and Electric Co. and promotional director for the society, has analyzed it in this way.

Since 1931 the sales reports from dealers in P. G. & E. territory on washers and ironers have told a sad story:

Year	Washers sold	Ironers sold	No. of washers to each ironer
1931	19,396	3,539	5.5
1932	17,620	2,904	6.1
1933	20,572	3,971	5.2
1934	27,000	6,691	4.0
1935	30,000	9,537	3.2
1936	36,971	10,224	3.6
1937	32,642	7,603	4.3
Saturation, '37			
Local	56.7	8.3	6.8
National	55.5	5.9	9.4

These figures reveal that the improvement in percentage of ironer sales to washer sales has been so slight as to be discouraging; and last year, despite a campaign in September, the percentage slipped from 3.6 to 4.3 washers per ironer sale. In this connection, the chart (see cut) of ironer sales by months for the three years, 1935-7, and the effect of campaigns upon sales totals, is also revealing.

Analysis last year of advertising expenditures by company and dealers was possible for the first time as a part of the studies that division sales managers made in order to compete for the Crawford Trophy. These figures showed that in the six-month period from May to October dealers spent 30.6% of their total yearly advertising budget on refrigerators, 45% on radio, 8.8% on washers and only 3.8% on ironers. Furthermore, during the September ironer campaign P. G. & E. spent $20,271 on advertising—but dealers spent only $11,344 during the entire six months. These expenditures evidently were the dealer's own measure of the importance of ironers to his total business. They indicate a lack of interest for which there must be some reason.

It was not because no promotional work had been done on ironers. For two years the society had two women working in the field, giving dealers and sales people training in ironer sales and demonstration, giving demonstrations in stores and helping dealers to advertise and promote ironers. Fifteen classes had been held to train sales people to iron. The same campaign procedure used with success in other appliance promotions had been employed. And still the results had been only fair. At least Reynolds never felt that any permanent headway was being made to bring the ironer up to a level justifying the same attention that dealers gave radio and refrigeration.

That was the sorry ironer picture. Now what was the matter?

The question was put to groups of sales experts—the distributors of appliances, dealers, salesmen—in a series of conferences. They came up with the following ideas:

Standard methods of selling and merchandising that are successful on other appliances of fair or good acceptance do not seem to be sufficient for ironers. Advertising?—Dealers have found it does not produce business and have quit. Display?—This has been used too, without much result. Conversational salesmanship?—The ironer seems to require special training of salesmen. Demonstration?—Certainly there has been plenty of it; perhaps not of the right kind.

A meeting of 15 distributors uncovered other reasons. First, the customer—Despite the demonstrations she has seen, she still thinks she cannot use an ironer and do good work.

Second, the salesman—He has found that it takes too much time and bother to sell an ironer. His commission does not compensate him for the effort required to make a sale. He must learn to iron, must make his own demonstrations and teach the prospect. And too many ironers have come back on him because the customer has not been properly taught its use.

Third, the dealer—He feels that the ironer business requires him and his salesmen to do too many things in addition to the normal things he does to sell faster-moving appliances. He thinks the margin does not permit such costly selling.

Fourth, the factory distributor—He has been thinking primarily of washers. Since the percentage of washers to ironers has always been about the same, he thinks the situation is normal. He has never thought of the ironer in terms of washer saturation.

From the retailer's and the distributor's standpoint, it is mighty important that ironers get up into the money-making class. Their other lines of

WHY LIFT AN ELEPHANT?

The woman who stands and hand-irons a big family washing lifts over 6,000 pounds every week—three tons with one hand and one arm, poor thing! Like lifting an elephant! And her arm travels six and a half miles!

Who wants such doses of unnecessary work in this modern age? Sit down and take it easy—rest your feet and your back — do better work in a fraction of the time with a new electric ironer.

Don't be an "elephant-lifter" any longer. See your dealer today.

Electric Appliance Society of Northern California

SAN JOSE UNIT

"Stopper" headlines like this characterized the appliance society's ads for the ironer campaign. No newspaper was allowed to run these ads unless it secured equal space from dealers. On the opposite page are two scenes from the skits presented at dealer meetings before the drive

merchandise are becoming harder to sell. Take a few examples:

Refrigerators sold easily at first: practically everyone wanted one. To benefit from it, the buyer needed no particular training on the use of the refrigerator. So saturations went up, especially in the higher income brackets. With such saturation, the refrigerator market is now to be found in the lower income brackets; and this requires more and costlier selling. The purchaser of low income must be convinced that she can effect a saving in foods with which to pay for the refrigerator. Often it requires teaching of efficient use of the refrigerator. And so the refrigerator moves into the same class of selling as the ironer. It will require more calls, more talk, more demonstration. Even the replacement market has the trade-in problem tied around its neck.

To the wholesale distributor of washing machines and ironers, ironers are also vital. Laundry equipment has for years been manufactured and distributed by a few exclusive laundry-equipment makers. Even the washers and ironers carrying the brands of other lines have been made in these factories. However, with the expansion of their lines to cover the "all-service" idea, a large number of the biggest refrigerator manufacturers have added washers and ironers to their brands and come forth with a complete line of appliances. This has the effect of thinning out an already thin ironer market. The alternative is to do something to the ironer market to expand it so that the proportionate share of a larger total sale will still mean good business to the manufacturer and his distributor.

Such was the reasoning upon which the plans for the test campaign were developed. San Jose was selected because it is a city of medium size, still threatened by the competition of San Francisco stores to be sure, but far enough away so that the special features offered would have appeal. Dealers and utility work closely together and the quality of the stores is high.

From experience with other lines of appliances, Reynolds derived this "law":

The speed at which an appliance is accepted by the public is in inverse ratio to the amount of time and attention that the user is required to give to its utilization and operation.

As examples: The user of a refrigerator merely opens the door, puts food away and forgets it. The radio requires only the turning of a knob to get the music or entertainment wanted.

Toasters are an excellent example. For years the non-automatic types burned toast that was not being watched carefully. People got angry at toasters and reverted to making toast in the oven. Toaster sales dropped. June brides received them as gifts and put them on a shelf. Along came the automatic toaster which did all the thinking and watching. Users put bread into it; out came the toast. The public paid three times as much for these toasters and sales went up.

With the washing machine the situation was much the same. Clothes were dumped into water and soap, and the machine did the work. Yet note how sensational has been the response to a washing machine that is fully automatic and can be left to do all the washing operations.

The ironing machine is more like the sewing machine in the utilization problem. The woman must go to the ironer or sewing machine, sit down and direct clothes through it skillfully. She must stay with it all the time it is running.

Sewing-machine selling went through the same evolution. When first introduced the high price carried with it lessons in operation. Prices later went down and sales fell off because people were expected to know how to sew. Prices went back up and permitted the type of selling that included lessons and a trade-in allowance for the old machine.

To a certain extent, this same problem exists with the ironer. Purchasers must be taught to iron. Marketing must be so set up as to provide for that type of selling. Otherwise purchasers who have difficulties will not be enthusiastic boosters.

Now for the San Jose plan:

Crux of the plan was an agreement by all dealers and distributors to raise the selling price of each ironer in the lines he carries by $10. This extra margin is to provide the following:

For the customer who thinks she cannot use an ironer and do good work—$6 of that $10 will pay for three ironing lessons in the home. Reason for teaching in the home is vital. When teaching is done in the store, other prospects stand around and watch. The customer hesitates to ask questions, or perhaps some little argument arises and the watching prospects side with the customer rather than with the teacher and thus build up a sales resistance in their own minds. Teaching should be done in the woman's own home and on her own clothes.

One thing the teachers are required to do. If the woman feels that she cannot iron any type of garment on the machine, the teacher is not to argue about it. Let the woman iron such a garment by hand. She is to be told how much good she can and will be

able to get from the ironer by ironing other things that are easy for her, and so saving her time and energy. On such things the customer will agree; and accordingly she will begin with a positive attitude of mind toward the ironer. Later she will try her hand at the troublesome garment.

For the salesman who feels it takes too much time to sell an ironer, compared with other appliances—$2 of the $10 will go as extra commission on the sale. Once an ironer is sold, he is relieved of all responsibility to teach its use. With additional compensation for selling, none of the expense of teaching and less chance of a revert from a dissatisfied customer, the salesman should regard ironers in a new light.

For the dealer who has been convinced that ironers are too costly to sell under present margins—the extra costs of selling, namely, extra commission and teaching expense, will be provided for in the extra $10. The remaining $2 of the $10 dealers have pledged to use in payment of a thorough ironing lesson to previous purchasers who may be having difficulty with their ironers and hence are knocking rather than boosting.

For the factory distributor who has been thinking primarily of washers and has taken only what came on ironers—the plan offers a program to remedy the ironer situation and to raise the ironer volume. The distributor in this campaign polices the execution of the campaign. The experience he thus gains will help him to guide future selling policy.

Most important by-product of the campaign has been its diversion of the stream of activity away from customary shirt-ironing.

"We are not going to try to teach women to iron shirts or sheets. In fact we are going to get away from shirts entirely," said Reynolds at the start of the drive. "The purpose of this campaign is to establish a new criterion by which people judge an ironing machine—not shirts. We want the customer to judge an ironer as she would a refrigerator. In selling a refrigerator we would not think of insisting on her making strawberry sherbet. We would not fling it in her face every time she looked at a refrigerator. We would not talk strawberry sherbet until she was afraid she couldn't use a refrigerator unless it was to make strawberry sherbet. No, we try to find out what there is in the refrigerator that appeals to her and we work on that.

"With the ironer we have concentrated on the idea that the very existence of the ironer has been to make shirt-ironing easy. When the woman sees an ironer demonstrated, it is on shirts. She watches awhile, then someone else comes along, asks a question, and the demonstrator starts all over again. The shirt never seems to get ironed. And though she may not say so, the customer thinks to herself that she could iron a shirt much more easily by hand, and besides, she does not want to iron shirts anyway. Her husband is too fussy about the way his shirts have to look. So she passes up all the other advantages that an ironer offers her in time saving, labor saving, money saving and better results for the routine ironing that is easy."

Because the program is a test plan, it has been the desire of all participants to make it a fair test—to remove all "bugs" so that if the program is found to be sound it can be applied to other communities. A more far-reaching result hoped for is that the plan's success will influence the manufacturers of ironers, through the price-control laws now available to them, to franchise dealers and to increase the margin on ironers. The extra margin should be pledged to provide more compensation for salesmen and a definite schedule of home teaching for every ironer sold.

This San Jose program was launched early in the fall by several organization meetings immediately followed by two general meetings for dealers and their sales people. At the first of these general sessions, William Sheehan, of Apex-Rotarex Co., staged a number of skits illustrating the campaign philosophy. The second session, held after settlement of the San Francisco strike had freed warehouse stocks, served as a check-up meeting.

Once started, the campaign was advertised extensively. Both San Jose newspaper carried large appliance society ads. These were run weekly, provided the papers secured tie-in ads from local dealers equal to or in excess of the society's 45-in. space. Radio spot announcements and a series of five short radio skits were also used. Display cards were furnished all cooperating dealers. Teachers were specially trained on giving in-the-home ironer lessons to buyers.

What have been the results to date? First, remember that the campaign started while San Francisco warehouses were closed by strike. Next, remember that the public has only recently begun to think of Christmas shopping and that many people have delayed buying ironers which they intend to give as Christmas presents.

Finally remember that figures so far released do not reflect advertising or sales in November, when the campaign got its second wind and began a renewed promotional campaign.

For these reasons, sales in proportion to advertising during the June-October period may not seem to be large. They are:

Ironers	June	July	Aug.	Sept.	Oct.
Units sold	37	32	26	44	28
Advt. col. in	30	34	81	315	229

Washers	June	July	Aug.	Sept.	Oct.
Units sold	194	254	261	201	250
Advt. col. in	436	483	409	247	454

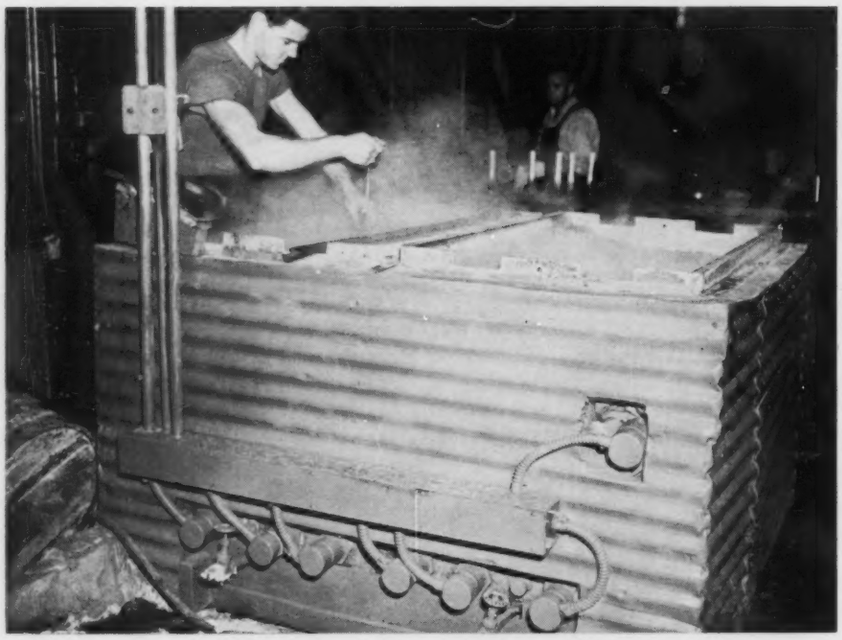
Nevertheless, four large dealers in San Jose express themselves in favor of the plan and its operation. Asked, "Has the test plan helped you sell ironers?" all answered yes. One qualified his answer with, "as a promotion"; another said that it built confidence but that he had no tangible evidence of its effect.

Asked whether purchasers are interested in the home lessons, three gave a postive affirmative; one said no particular interest was noted.

Asked whether the teaching program was satisfactory, all answered yes. Asked if they wanted the test plan continued after Christmas, two answered yes; two preferred to withhold their answers until later. The same response was given a question as to whether they would follow such a plan conscientiously if permanently adopted.

All felt that the publicity given ironers was the chief benefit of the program. They believed that dealers should have special salesmen trained to work on washers and ironers.

Final verdict on the success of the plan must await the end of the Christmas buying season, however. If the extra Christmas business in ironers is as good as expected, much greater enthusiasm is sure to be shown.



Modern is the word for Lumidor Mfg. Co.'s plating plant at Alhambra, Calif. Both caustic-soda and water-rinse tanks are electrically heated. Placed side by side (as shown above), the two tanks are surrounded with 3 in. of vermiculite held in place by a corrugated iron casing. Heat is provided by three 4-kw. immersion heaters in each tank. A thermostat in the rinse tank controls all heaters through a magnetic switch. Service is at 230 volts, three-phase. At night and during shut-downs an insulated cover is placed over the tanks and a time switch is set to turn on the heat several hours before the tanks are to be used again. Temperature of the baths is ordinarily kept at about 200 deg. F. Result of the electrical installation has been a reduction of disagreeable odors and excess heat

Industrial Sales in Southern California

BAKED enamel finishes are attracting the attention of the manufacturer who wants to increase the durability of his product. Baked finishes have long been recognized as superior to air-dry finishes because of their ability to withstand abuse and retain their original attractiveness. In addition, baked finishes can be thoroughly hardened in one hour or less—this, as opposed to the many hours required for air-dry finishes. Where speed of production is important, baking greatly reduces the processing time required for the finishing operation and thus contributes to a lower over-all cost.

A representative case is that of the Utility Fan & Mfg. Co., a Vernon, Calif., firm, which in 1937 brought out its successful air-cooling device, the "Dezert Kooler." Since this equipment is ordinarily placed outdoors, it is subject to weathering, a severe test of the finish. Therefore, in order to provide greater durability, the manufacturer decided to use a baked enamel finish.

After an analysis of requirements, engineers of the company voted in favor of an electric oven for the baking operation. This decision was prompted by the many advantages of the electric oven and its reasonable operating cost.

Accordingly, a 12x12x8-ft. oven was designed and built by the company. The walls were insulated with 3 in. of rockwool between the sheet-metal lining and the outer shell. The ventilating ducts are entirely within the oven proper, and an exhaust fan is provided to discharge the required amounts of air.

Electric heat is provided by 45 kw. of oven-type heaters placed directly in the oven chamber and controlled by a recording thermometer.

Put into operation several months ago, the oven has since then been used 16 hr. per day during rush periods. Baking temperature is from 275 to 300 deg. F., depending on the enamel and the speed desired. The ordinary baking period is 1 hr., and the oven recovers to baking temperature within 15 min. after a fresh change of 2,000 lb. of steel parts is put in. After an overnight shut-down, the oven will come up to 275 deg. in about 30 min.

Since the plant frequently operates two shifts per day, the recording thermometer is valuable in affording the superintendent a picture of the oven operation during times when he is not present. A 24-hr. chart gives a complete and permanent record of the number of charges handled, the time of each bake, the period required for changing loads and the temperatures. Utility Fan owners state that the extra cost of this graphic instrument is more than justified by the supervisory control it provides.

All manufacturers who require a superior quality of finish on their product should be considered logical prospects for an electric oven. The time is ripe for creative selling of the many advantages which electric heat can offer in this field.

THE Antelope Valley *Gazette-Register* of Lancaster, Calif., is not a large newspaper, but its printing shop rivals almost anything the big boys can boast. The reason: When Publisher Paul Hubbard enlarged his plant, Southern California Edison Co. industrial heating engineers sold him on the desirability of electric heat for stereotype melting.

Hubbard's problem was twofold: The combination of high summer temperatures and heat from a fuel-fired pot was annoying; operating requirements demanded a pot capable of holding 1,000 lb. of metal.

Since there was no ready-made equipment which would answer the purpose, Edison engineers designed and supervised construction of an electrically heated melting pot. Today, as a result, Hubbard can say that his new equipment is performing in a most satisfactory manner.

The melting pot proper—18 in. in diameter and 12 in. deep—is made of welded steel instead of the usual cast iron. It is surrounded on all sides by rockwool insulation and is contained in a steel supporting shell. An insulated cover which can be conveniently opened for charging and pouring closes the pot while in operation.

Heating element is a 5-kw. cast-in Calrod operating at 230 volts, single-phase. It is controlled by a thermostat set for the proper temperature. From a cold start, a 1,000-lb. charge can be melted in about three hours. Consumption averages .015 kw.-hr. per pound of metal melted.

ELECTRICAL WEST

Appliance Sales Guide

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Sell While the Season is Cold

In season—when it's cold—or out of season—(for a number of uses listed below)—there is money to be made selling the good quality auxiliary electric heater and the bathroom electric heater. In cold weather, one placed in the store entrance, connected and operating, throws a stream of warmth to chilly passers-by that invites them in to buy. There are rooms or corners in any house that are never warm enough. furnace or no furnace. There are days when it is not worth while turning on the whole heating plant for a little comfort. Bring out the electric heaters on cold days as the dry goods store brings out the umbrellas and rubbers when it rains.

By selling well made, quality electric heaters you profit most in the long run. By cold weather seasonal selling you get—

Quick turnover, from fast sales.

Repeat business; for every home needs more than one.

Money to be made in Electric Heaters

Better margin, from a higher priced article that stays sold.

Satisfied customers who boost the heater and buy again.

No service cost. The well made electric heater lasts indefinitely with ordinary care.

Low sales resistance, because for several years these heaters have been advertised extensively and sold in the West.

A profitable side line for salesmen the year around. They make an ideal combination sale with an electric range, replacing the old stove for warming the kitchen, keeping the kitchen clean, etc.

So, watch the thermometer. When the mercury goes down. bring out the electric heaters. They sell best then. To sell the wall type of bathroom heaters. why not follow-up on your customers.

Where else to sell them

Nothing you sell can be made to bring so much repeat business as the quality electric heater, properly sold. An idea of its usefulness in home and office suggests to any salesman where else he can sell one or more. In the following list a few of these versatile uses for electric heaters are given. These uses can be told to the prospect. They help make the sale and to sell other heaters later. The more useful you can make it, the more reason you give to buy.

Quick warmth for—
Shaving, bathing and dressing,
Baby's bath, or warming baby's clothing.

Drying heat for—
Pets after bathing,
Towels, or to warm them.
Hair after shampoo,
Wet shoes,
Photographic prints,
Glues in woodwork or repairs,
Wet paint or plaster.

Directed heat for—
Thawing frozen pipes,
Eliminating excess moisture,
Raising bread,
Toasting marshmallows, etc.

Safe heat for—
Children at play on floor.
All night use in a sick-room.
Use in closed rooms,
Vaporizing cold medicines.

Therapeutic heat for—
Baking out sore spots and aches,
Infra-red ray treatments,
Preventing mildew and fungus.

Convenient heat for—
Theater box offices,
Toll stations,
Cashiers' booths,
Cigar stands,
Small offices,
Telephone operators,
The one cold blooded person in an office who needs extra heat,
Elevators,
Resort cabins,
Restaurant booths,
Doctor's examination rooms,
Oil stations,
Small stores,
Dressing rooms, beauty parlors,
Bank vaults,
Lodge hall offices,
Fitting rooms in stores,
Localized heat in factories,

December 1938

Electric Air Heaters

. . . When the

Cold weather brings a natural demand for more heat. With every cold day the wise dealer will bring out electric heaters as the wise shoe store man brings out the rubbers when it rains. The auxiliary electric air heater sells best when the public is looking for additional sources of heat to tide over a cold spell.

Built-in bathroom heaters, on the other hand, must be sold when a house is being built or remodeled. When the bathroom is being modernized, the electric bathroom heater is a "natural" for making the job completely modern. The time to sell such heaters is when the house is being built, regardless of the season and whether the weather is cold or not.

In either case the resistance to the sale of electric air heating is likely to be one of the following:

1. **"I've heard it isn't good to use in a bathroom."**
2. **"It costs too much to operate it."**
3. **"We have a good furnace now."**
4. **"Do you get enough heat out of it?"**
5. **"I've seen one for about a dollar."**
6. **"Our wiring won't stand it."**

How do you meet these objections? Overbalance them with reasons why they should buy! Each make of heater of good quality has its own individual features, of course. These will be listed in the manufacturer's literature. But it is always more effective to set up pictures of pure advantage first, and then prove them with the special construction features of the heater, than to talk technical details first and leave it to the imagination of the prospect to figure out for himself the benefit he can derive from it.

•

Here, in a sentence or two, are the **advantages** of using an electric heater and of having an electric bathroom heater permanently installed. Below, and on the next page, these advantages are combined in examples showing how to meet specific resistances to electric heating.

1. **Instant heat** to take away the chill. Removes dread of getting up, bathing, reading or sewing in a cold room.

2. **A booster to any furnace** system when the weather gets extra cold.

3. **Saves starting the furnace** in spring and fall when only a little heat is needed.

4. **Independent of storage** of fuel. Plug it in any convenience outlet any time. Easily carried from room to room. Ideal for that "hard-to-heat" room.

5. **Simple and sturdy,** it never wears out. Can be tucked away in summer, used whenever needed.

6. **Has such a variety of uses** in home or office. In sickness and emergency it provides heat for many purposes. (See list on first page.)

7. **A healthy heat, perfectly safe,** can be used in closed rooms.

8. **Bathroom heater**

Unclothed body requires more heat than that provided by the general heating system—at least 80 deg. F. to be comfortable.

THE MONTANA POWER CO. • IDAHO POWER CO. • UTAH POWER & LIGHT CO.
PUGET SOUND POWER & LIGHT CO. • PACIFIC POWER & LIGHT CO.

Prospect Says: "NO"

NO. 12B AUXILIARY ELECTRIC HEATERS

1. **"Not good to use in the bathroom?** That would be true, perhaps of the cheaply built and poorly insulated heaters, but not with the well designed heater, and never true of the built-in electric bathroom heater. Modern homes are finding that it does not cost as much to install one of these bathroom heaters as to run a furnace flue to the bathroom. You always need extra heat in a bathroom too, for the body is unclothed there and it requires at least 80 deg. Besides this heater often saves starting the furnace when only a little heat is needed in the bathroom," etc."

2. **"Costs too much to operate?** That's an important matter to think about. Yet considering the instant heat, whenever you want or need it, and that it operates at the lowest steps of your rate, it can be used with real economy. It often saves you the starting of the furnace when only a little heat is needed on fall or spring days. In the bathroom, even in cold climates, people seldom use it more than 100 hr. a year, and that instant comfort is well worth the small cost of operation. Besides with this heater you need not buy and store fuel in advance. That's worth a lot, isn't it?"

3. **"You have a good furnace?** That's mighty fortunate. But don't you find, on some of those extra cold days that come unexpectedly, you need a little extra heat, in particu-

lar rooms or spots? With this heater you can supplement the furnace in those places where it is needed — especially if there is sickness. Then, too, in spring or fall when it is fairly warm, a cool day or evening often comes unexpectedly and you don't need enough heat to turn on the furnace. This little heater is a friend in such emergencies."

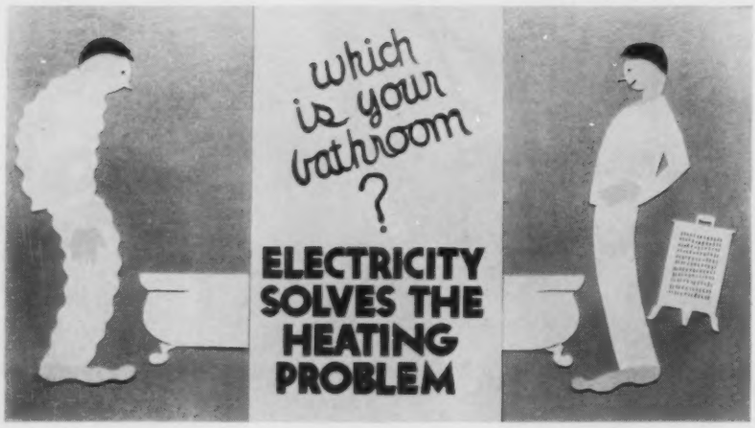
4. **"Do you get enough heat out of this heater?** That's a very pertinent question. No doubt you are thinking of those old fashioned and inefficient electric heaters of a generation ago, and unfortunately, many are still offered today. But I am glad you have had an opportunity to see this well designed electric

heater before buying. (explain the principles involved in delivering the heat). Besides this heater is simple and sturdy and will give you years of satisfactory service. Tucked away in summer, it is immediately ready to provide warmth any time."

5. **"You have seen one for about a dollar?** Yes, that is quite possible. There are even others cheaper than that, I am sure. But you want the peace of mind of a really well designed and safe device as well as its better ability to deliver warmth in the most economical fashion, do you not? Now this heater gives you many advantages. First, it provides instant heat to remove the chill of a room. It can be used to supplement the regular heating system on extra cold days, etc. And to be able to do this it must be sturdy and safe for years of use. In order to do this, this heater is designed in this way." (explain the special construction features then as proof of its worth.)

6. **"Your wiring won't stand it?** That is really an important point. Yet the many services that this little heater will perform for you during its many years of life would justify the installation of more wiring and convenience outlets in your home. When you consider that you can have warmth instantly, day or night, winter, fall, or spring, in emergencies like sickness, or just unexpected cold days, it is worth a good deal to have the facilities to use one or more of these heaters. This heater makes you independent of the storage of fuel—the power company keeps it always on hand for you. Then, too, the wiring would provide convenience outlets for the use of other electric appliances, and floor lamps. I can arrange to have the wiring installed, if you like."

ROCKY MOUNTAIN ELECTRICAL LEAGUE • PORTLAND GENERAL ELECTRIC CO.
CALIFORNIA OREGON POWER CO. • WASHINGTON WATER POWER CO.



Easy Ways to Advertise

can deliver them an electric heater right away, the minute it gets cold, is to wrap an envelope stuffer, available from the manufacturers of your makes of heaters, with every package in the store. Do this all during the cold season. Mail one with every bill or letter. Better yet is to write a number of personal letters to your customers. Make them simple and man-to-man. Say, "The first cold snap that comes along will reveal a number of places in your home in which it would be a blessing to have an electric heater to bring quick, cozy heat. When that day comes, phone us to send you one of these heaters. It will be right out to save the day for you."

● At left, a clever window background—easy to make, too

Cold Weather Makes Hot Prospects for Electric Heat

Be Prepared

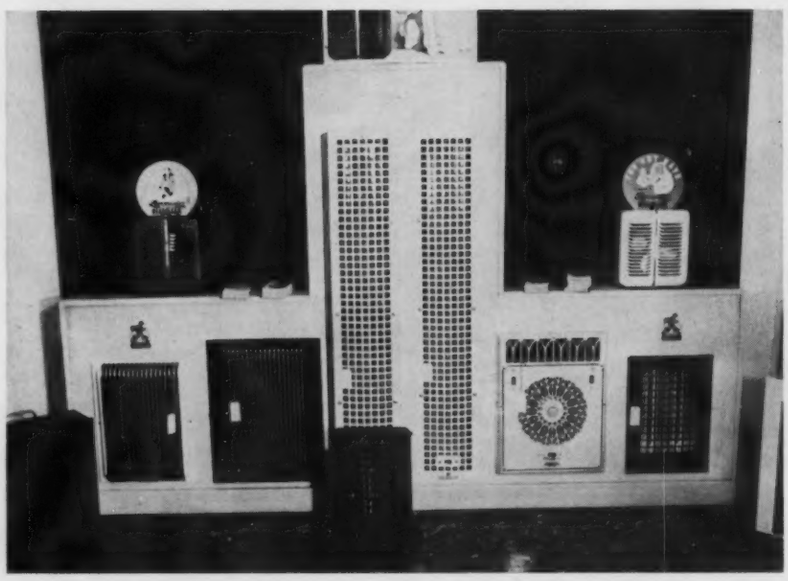
Surveys show that people buy electric heaters when it gets cold, and want immediate delivery. Watch the thermometer. When a cold day dawns be all ready to (1) put a display in the front entrance, with a heater going. (2) Have short, easy-to-read ads ready to put in the paper. (3) Be ready to put a display in the window. (4) Better yet, start some salesmen out with home demonstrations. (5) Offer time payments to make it easy to buy. You'll get results.

Use Sales Helps

When a manufacturer develops a clever sales idea for bringing in old and business-killing heaters, and good prospects for a sale at the same time, (like that at the left) it is smart to play it up with window displays and letters to customers. Cards and display helps are worth using. They save time in getting a display together and allow you more to make sales. With a short season in which to work, use every minute-saving idea.

Always on Display

It is good business to keep a display of electric heaters handy the year around, particularly of the bathroom and wall insert types that should be displayed on a wall space panel like that at the right. There are uses for electric heating the year round. Ordinarily customers do not realize these needs. Whenever you have a chance, talk bathroom heaters, or auxiliary electric heaters, and the sale will more likely come your way when they are ready to buy. Remember the sales advantage points to electric bathroom heat are: 1. *Absolute safety*, in the wall installation; 2. *No fumes* or vitiation of the air in a closed room; 3. *Immediate feeling of warmth* on the unclothed body from radiant heat; 4. *No smudge* above heater; 5. *Cleaner appearance;* 6. *Most modern method of heating.*



The Forgotten Clock—Sell It This Xmas

Before making any final plans for your sales drive this month, go over the electric clock situation thoroughly. You'll find that the number of clocks you can sell will more than make up for their small gross profit

REMEMBER the electric clock? Your answer to Christmas-present problems? The thing that controls your day? Of course you do.

For the sake of the electrical industry—the manufacturer, wholesaler, dealer, utility—don't ever forget it. This month especially. Because electric clocks mean money in your pocket. Figures prove it.

Compared with refrigerators, ranges, washers and ironers, clocks do not retail at a very high price. But during a five-year period, 1933-37, there were 12,410,000 clocks sold. Only irons topped this number.

And during the same period clocks had a load revenue of $14,147,000—more than that of ten other appliances, less than that of only refrigerators, ranges, irons and toasters.

So the electric clock is an item to push. Particularly in view of the fact that Christmas shoppers esteem its gift-value. When handbags and wallets, silk hose and socks, handkerchiefs and neckties fail to please, shoppers turn to clocks. And frequently they turn to clocks even before they have considered any other present.

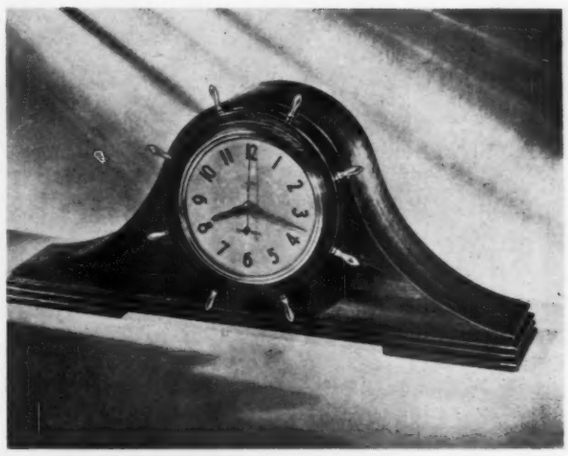
Why? There's probably no one reason. Clocks look expensive yet cost little. They always are usable, in spite of the fact that people generally own three or four already. They last, not for weeks, but for years.

This, then, is a ready-built market. You don't have to push clocks to sell them. But if you want more money, easily and quickly made, push them anyway.

Here are some tips from two stores, probably the most successful clock retailers in San Francisco:

Miss Helen Richards of Schwabacher-Frey, a stationery store which sells everything from ink to pocketbooks, says she depends on two main selling points: First, clocks are sealed in oil and self-starting; second, beauty. Miss Richards admits she doesn't know much about the mechanism of electric clocks, but she uses the sealed-in-oil, self-starting line because it sounds important.

When it comes down to a question of what present the customer shall buy, Miss Richards urges clocks. "There's less profit in them," she says, "but there's a bigger turnover. There are fewer returns. Clocks don't deteriorate on my shelves. But, above all, there's less grief in selling clocks. They're clean to sell. They come wrapped in a box. So all I have to do is take the number of the clock, fill out a sales slip and send it to the wrapper."



Ship's-bells clocks will sell in towns on the water

One thing that Miss Richards points to with pride is the number of clocks she has sold since she joined Schwabacher-Frey. Her predecessor wasn't enthusiastic about clocks: she ordered only those she herself liked. But when she took over, Miss Richards immediately added all models of all lines. Demand increased.

Now she's looking forward to the day—soon to come—when the clock display is enlarged and made more attractive. The present display, she feels, does not do justice to sales. Schwabacher doesn't advertise clocks; but proof that they will sell, and sell fast, is the fact that when a clock display is set up on a table in the center of the main aisle, sales go up.

What is Schwabacher-Frey going to push this Christmas? It's a tip for every dealer located near the ocean. The answer is electric clocks with ship's bells. San Franciscans, Miss Richards says, are waking up to the fact that they have a seaport and that it's a nice idea to employ the nautical motif in their homes. So she's getting ready for the rush of business by boosting ship's-bells clocks, tied in with nautical bookends, etc.

Mrs. Myrta St. Claire, who heads up the Emporium department store's clock section, agrees with Miss Richards on most points. Her idea on how to get the most out of clock sales is to "know your clock thoroughly."

She does. She can take apart any clock that comes down the line. If a new model puzzles her, she calls up her supplier and gets the information she needs. The result: She rarely loses a sale. "Motors," she says, "will outsell the case: people buy a good motor rather than a good case."

The answer to her statement, which may seem unusual coming from a woman, is that she doesn't have much faith in the appearance of electric clocks. In fact she sides with Miss Richards, who complains that, because so many electric clocks "look cheap," her spring-clock-electric-clock sales ratio is 50-50.

Mrs. St. Claire points up this complaint. She doesn't agree that spring clocks are selling on a par with electric clocks, but she does say that she can't sell as many electric alarms as she might because they look like the Big Ben, which is slightly cheaper.

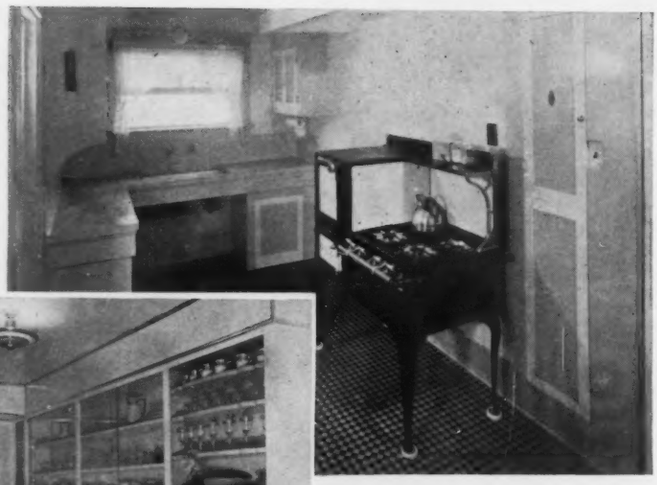
"The newer clocks are not good looking," she says. "We still have the originals of many 1938 lines; can't sell them. But some of the older models are selling like hot-cakes. The motors being equal, I can sell the older clocks as well as the newer ones."

One thing she would like to call to the attention of the manufacturers: "Don't discontinue or reduce the price of a model which is selling well. Here's a modernistic clock now selling for $5 which originally sold for $10. We sold just about as many at the old price as at the new."

All troubles considered, however, Miss Richards and Mrs. St. Claire believe that electric clocks are as easy to sell as almost any kind of merchandise, electrical or non-electrical. If that's the opinion of people working in large variety stores, it's valuable.

So push—and sell—clocks.

A Designer Works on His Own Kitchen



For years Louis Politowski, ace kitchen designer for the Los Angeles Bureau of Power & Light, has been helping other people turn unworkable, dingy kitchens into up-to-date, spotless kitchens. At last he has gone to work on his own kitchen. Above is the original room, as old-fashioned as many another headache. At left is the same room done over. In spite of the almost minute size of the kitchen, work surface has been greatly increased.

MaRoney's

Is an appliance store. Here's how it makes sales

By J. EDWARD TUFFT

There is no use disputing it: MaRoney's, Santa Ana, Calif., appliance and furniture store, is one of the leaders in sales of refrigerators in cities of 40,000 and less.

At the present time, every eighth home in Santa Ana, a typical middle-class city of 35,000 population, has either a refrigerator or a range bought from MaRoney's. When Southern California Edison Co. offered a prize to the leader in refrigerator sales a while back, MaRoney's walked off with the honors. Generally speaking, MaRoney's sells up to 50 refrigerators monthly.

Owner Frank MaRoney's methods are full of punch. He makes more than 75 per cent of all sales on the floor and, more important, on the occasion of the customer's first visit. Another 12 per cent are made by a follow-up call at the home that same evening.

How does he do it?

MaRoney has no outside salesmen and doesn't want any. He maintains that the money he would ordinarily spend on outside salesmen is better spent on display advertising in the major local daily newspaper. He says that door-bell pushing is exhausting and costly. He wants his salesmen's energy saved for concentrated sales work, which doesn't mean high-pressure in any sense of the word.

Salesmen in his store are taught that pointing out the food features of a refrigerator and saying that they are there gets you no place. But handling of parts, definite demonstrations and good dramatization mean plenty.

To sell refrigerators in a big way you must have an enormous stock, MaRoney says. To this end he keeps from 75 to 100 units on the floor throughout the season. "To dominate in sales you must dominate in stock" is his slogan.

MaRoney believes in selling the product of one manufacturer only. This gives him five models to work on and opportunity for complete service. He states in practically every advertisement that "not one customer of this store has ever paid out one penny on repairs on any electric refrigerator bought from the store."

He insists on writing his own advertising copy and designing the lay-outs. The results might give a professional ad-man the jitters; but it is a fact that MaRoney has never written an advertisement that did not make sales. This is because his language is dynamic, forcible and direct and emphasizes pulling points.

These ads run at least three times weekly. In size they vary from 5 columns, 15 in. to a full page. He also makes twelve spot radio announcements daily. In this spotting, he features three things over and over again—the place, the merchandise and the name. Occasionally, when it seems wise, he rings in the price.

For final proof that MaRoney knows how to sell, consider this one incident: A professional shopper wandered into the store one day. She didn't want to buy; she was merely looking. But before she left, she signed up for a major appliance.

Hardware Stores

In British Columbia go in for appliances in a big way

When electrical appliances take their place in a hardware store it should be on a large scale. Such is the opinion of the merchandising advisers of the Sunset Hardware Stores in British Columbia.

This group comprises a large number of independently owned stores and a number of stores owned by McLennan, McFeeley & Prior, Ltd., Vancouver wholesale electrical and hardware dealer. Their specialized staff of display and merchandising men have consistently urged development of electrical departments in hardware stores.

Largely as a result of this advice, the most imposing displays of appliances found in many areas of British Columbia are in Sunset Hardware Stores.

One of the best examples of such a well arranged display is in the hardware store of Walls & Bradshaw, Nanaimo. Here approximately half the main-floor is devoted to electrical goods. Ranges, mounted on individual wooden platforms with wheels, are shown down one side of the store. Because of this mounting, the ranges may be wheeled into the center of the room for an all-round inspection by the customer.

Washers and refrigerators are displayed against a low partition which cuts the electrical department off from the hardware department. Radios, lamps and smaller appliances are arranged either against this partition or on display stands and tables.

In addition to its appliance-sales operation, the firm also runs a well equipped radio and electrical service department.

Precept

And how the Electrical League of Utah follows it

One sure way to be successful is never to overlook an opportunity to promote your business. With this precept in mind, the Electrical League of Utah is taking advantage of every chance to push adequate wiring, appliance sales and the industry in general.

Excellent example was the way the league virtually stole the "Own Your Own Home" week of the real estate and building industries of Utah. Over-all promotional work to stimulate home ownership and building included special newspaper advertising, lecture tours, radio plays and a home show.

The Salt Lake *Tribune* issued a "Better Homes Section" in which league members did extensive advertising and the league itself published a number of build-up stories.

The home show was also conducted by the *Tribune*, which made its auditorium available for the week. Model homes were displayed, daily interior decorating demonstrations given, booths exhibited materials and methods. The electrical league had a booth stressing the need of adequate wiring.

A skit, enacted by University of Utah players, was presented by the league to a packed auditorium. This told a home story in which the inadequacy and outmoded home was brought into sharp contrast with the modern and conveniently wired home.

Other activities of the league seem no less result-building.

Considerable publicity was given the first home certified under the adequate wiring specifications adopted by the league. At last report, 19 homes were being constructed in Salt Lake City to conform with these specifications. In addition, approximately 30 home-builders increased electrical facilities in their homes beyond original plans.

In an attempt to reach the prospective builder, letters pointing out the sales advantages of adequately wired homes are sent to all real estate companies, lumber companies and building contractors. These letters hammer home the idea that "you can point with pride to the abundance of electrical outlets and other up-to-the-minute electrical conveniences everyone expects in the home of today."

An extensive billboard advertising campaign, carrying the slogan "Give Electrical Gifts," is now being carried out in Salt Lake City, Ogden and Provo in preparation for Christmas sales.

In October, the league tied in with washer-ironer week by furnishing dealers with stickers and sales ideas. It advocated tie-in with the "Discovery Month" of the national range campaign and sponsored the public educational meeting at which Dr. Philip Thomas, Westinghouse, and George W. Wheelwright 3d, Polaroid Corp., spoke.

One final league promotional idea is the award, to be made for the first time this year, to the junior chamber of commerce which develops the best outdoor Christmas lighting activity in its community. This award is based on residential, commercial and street lighting.

West vs. U.S.

Easy Washing gives out a few facts on washer-ironer consumption

The eleven Western states have only 10% of the total U. S. population, yet 20% of all washer and iron business is done here. This is twice the per-capita consumption of the rest of the nation. Furthermore, the average price paid for washers and ironers in the West is $77.50 as against a national average of $73.39.

Such was the message Fred S. Fenton Jr., division sales manager of Easy Washing Machine Corp., brought to dealers in a series of meetings held throughout the West last month.

Fenton said that the average price paid for Easy washers and ironers is $93.69. Outlining his company's plans for next year, he announced that the price of all ironers will be raised $10. A special three-speed, three-heat cabinet-type ironer with a steel chair and all deluxe features will sell for $20 more.

Flexibility

Is what B. C. Electric Railway has achieved in its show-windows

Flexibility in colored lighting and in the shifting of backgrounds to suit any possible display has been achieved in a new show-window setup developed by W. E. Parnum, display manager of British Columbia Electric Railway Co.

Recently installed in the company's Granville St. store, Vancouver, the display background is the result of many months of planning by Parnum and his staff. When they finally arrived at what they considered the most advantageous arrangement, they constructed a small-scale model, exact in every detail down to miniature lighting, to make sure that the final effect would come up to expectations.

The plain background (see cut, next page) gives greater access and extra space for deep-set displays. Thirty-six movable panels and set-pieces, some 12 of which are fitted with movable colored-lighting effects, enable the company to design literally hundreds of different settings. This is especially important inasmuch as the company is constantly showing many different types of merchandise.

Bold posters can be rigged on these set-pieces, and the lighted panels can be used in any position to supplement the colors of the channel lighting.

Cost of the work was reasonable because of the care taken with early plans. Another advantage of this planning was the remarkably short period of time required to complete alterations.

Chances of these window changes' boosting electrical merchandise sales in Vancouver seem excellent. Not only do they better serve the company's needs, but they should serve as an example to other merchants, teaching them how to adapt lighting to the greatest advantage.

Up 30%

That's what happened to radio sales in San Diego in October

Radio sales in San Diego County did a complete about-turn in October. In 1937 there was no radio promotion in the county and October sales were 3% lower than in September. This year, however, October sales were up 30% over September sales.

The reason: San Diego County Bureau of Radio & Electrical Appliances' "Radio Referendum" promotion.

This promotion (see ELECTRICAL WEST, Nov. 1938) was designed (1) to stimulate floor traffic in dealer stores and to develop more interest in current radio models; (2) to determine, if possible, what the average listener in that territory really thinks about radio. Aim No. 2 was the cause of No. 1's success.

Approximately 18,000 ballots, on which radio listeners were asked to set down their program preferences, were distributed. Returns totaled 1,009.

Musical programs are preferred above all others by 33% of the voters. Then follow news flashes, 20%; news commentators, 11%; dramatic programs, 10%; comedy skits, 7%; big-name programs, 7%; educational talks, 6%; sports broadcasts, 5%.

Asked, "Do you think there is too

B. C. Electric Railway Co.'s window design put to test (see preceding page)

much of any of the following types of programs?" listeners blacklisted blood curdlers by a 28% vote; jazz orchestras by 26%; political, 24%; symphonic, 5%; comedy skits, 5%; mixed programs, 5%; drama, 4%; news broadcasts, 2%.

Preferred method of putting over radio advertising is by a simple announcement as to who is sponsoring the program. Commercials in a lighter vein scattered through the program come second; straight commercials at beginning and end of program, last.

Other questions were answered as follows:

Do you believe that radio news broadcasts are impartial?—Yes (70%). Do you think that the prevalent type of children's program is harmful?—No (68%). Do you object to fairly long commercials when they are informative or educational?—No (64%). Do you feel that the average political talk gives you an opportunity for judging a candidate or problem?—No (58%). Does the constant reiteration of new popular melodies irritate you?—Yes (53%). Do you think there should be fewer radio stations in a given territory?—Yes (54%). Do you have trouble separating stations on your radio?—No. (56%). Do you miss the radio news and highlights formerly carried in your newspaper?—Yes (66%).

Increase in radio sales resulting from the campaign was not the only indication of interest in the poll. Proof that people take radio seriously was the fact that 267 people accepted the opportunity of going beyond the point of merely checking the ballots and wrote out comments ranging from a sentence to several pages in length.

Truly, as J. Clark Chamberlain, manager of the bureau points out, "this was the most valuable radio promotion ever undertaken by the bureau. It undoubtedly should be repeated next year."

Future Campaigns

More information to help dealers lay out their sales plans

Following are the dealer-utility campaigns and special events which have been scheduled for the next several months:

Arvada (Colo.) Electric Co.—December, special Christmas lighting contest for children.

B. C. Electric Railway Co.—January, announcement of 1939 Retail Dealers' Cooperative Sales Plan. February, intensive three-day training course to which will be invited dealers and their employees, distributors' appliance salesmen, the utility merchandise staff and all others directly interested in the sale of domestic electric appliances.

Colorado Central Power Co.—December, campaigns on IES lamps and other electrical gifts.

Coast Counties Gas & Electric Co.—December, lamp campaign. During the November billing period, all customers on four schedules received with their light bill a "Mazda lamp certificate" entitling them to one 150-watt lamp or one 100-watt lamp free with the purchase of six lamps of 60 watts or more.

Electric Appliance Society of Northern California—Dec. 1-24, a campaign under the slogan, "Score with Santa. Electrical Gifts Win." Campaign posters and ads feature Santa Claus giving three rousing cheers for practical, proper, sentimental and sensible electrical gifts. Pacific Gas and Electric Co. is tying in with newspaper ads saying, "Your Appliance Dealer—The Modern Santa Claus." Other promotion includes spot radio announcements, displays, stickers, etc.

Idaho Power Co.—January, campaigns on commercial cooking, residential lighting and laundries. Late in February the company will launch a range campaign.

La Veta (Colo.) Light, Heat & Power Co.—December, Christmas appliance sale. January, clean-up sale.

Mountain States Power Co., Casper, Wyo.—December, campaign on small appliances.

Nevada-California Electric Corp.—After a lapse of almost two years the company has gone back to general-system campaigns. The first of these, started Nov. 1 and ending the last of this year, was on ranges. Efforts are being made to clean up all existing stock plus a quota of new merchandise. In January and February, the company will promote washers and ironers.

New Mexico Public Utilities Corp., Gallup—December and January, adequate wiring campaign.

New Mexico Power Co., Santa Fe—December, Christmas lighting campaign.

Public Service Co. of Colo.—December, campaigns on IES lamps, vacuum cleaners, radios, washers and irons.

Puget Sound Power & Light Co.—January and February, campaigns on ranges, water heaters and refrigerators.

Sheridan County (Wyo.) Electric Co.—December, Electrical Appliance Jubilee.

Southern Colorado Power Co.—January, clearance sale. February, water heater campaign.

Southwestern Public Service Co.—December, campaigns on IES lamps and small appliances for Christmas.

Utah Power & Light Co.—January and February, campaigns on ranges, water heaters, sunlamps. Seasonal stock will be cleared out.

Western Colorado Power Co., Montrose—December, campaigns on IES lamps, ranges and water heaters.

Denver Electrical League—December, adequate wiring, Christmas outdoor lighting and Electrical Exposition. January, campaigns on IES lamps, commercial and industrial lighting, adequate wiring and kitchen modernization.

Sales Shorts

Light bills; EH&FA; census report; water heaters; oil men; etc.

MERCHANDISE sold by Seattle City Light will be advertised on light bills and envelopes sent out by the department, according to official announcement. It is hoped that this advertising will pay for printing of the bills.

●

ELECTRIC HOME & FARM AUTHORITY has signed an agreement with Puget Sound Power & Light Co. providing for cooperation in the financing of adequate wiring for farm and residential homes. The agreement was the first such signed in the State of Washington.

●

CLIMBING AT snail's pace is the value of orders booked for electrical goods. According to the U. S. Bureau of Census, orders plunged from $182,306,350 in the fourth quarter of 1937 to $154,153,559 in the first quarter of 1938. From that point they climbed—to $157,315,-

411 in the second quarter of 1938 to $158,958,951 in the third quarter. Totals cover electric motors, storage batteries, domestic appliances, industrial equipment, etc.

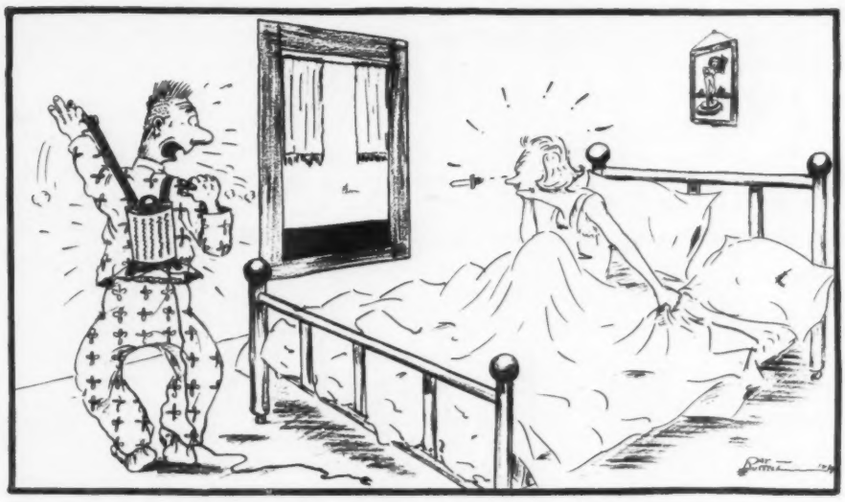
●

DIRECT SALE of water heaters for residential use has been discontinued by Northwestern Electric Co. Sale of heaters will henceforth be promoted through established dealer outlets.

●

"METERED MEALS on the electric range cost about $2 a month" proclaims a recent advertisement by Washington Water Power Co. It goes on to say: "Let us prove it . . . . Attend the free cooking school . . . . The entire menu will be metered on the electric range and actual cost computed right there."

●



"From now on, your feet will at least be on this thing!"

SOUTHERN CALIFORNIA EDISON CO. has been wooing the oil man with a series of direct-mail pieces briefly describing the advantages of the electric motor in oil-well pumping. Played up were the facts that the electric motor is more dependable, easier to operate, more efficient and economical, increases oil production and has a 50-per-cent lower first cost and a 50-per-cent greater salvage value. The folders advised the oil man to get in touch with his nearest Edison company office.

●

AN ATTENTION-GETTING window display for a motor house is one like that which Backstrand Bros., Riverside, Calif., has used successfully. Set up in the window was a small blower which directed a stream of air upward. Several balloons were kept constantly afloat in this moving current of air. Passers-by never failed to stop and take notice.

●

SPRING MARKET WEEK will be held in the Western Merchandise Mart, San Francisco, Jan. 30-Feb. 4.

APPLIANCE SALES REPORT---OCTOBER 1938

A Summary of Dealer and Utility Reports Compiled by Associations, Societies, Bureaus, or Dealer Contact Departments of Utilities

REPORTING COMPANIES	Idaho Power Co.[1]		L. A. Bureau of P. & Lt.[2]		Montana Power Co.[3]		P. G. & E. Co.[4]		San Diego Cons. G. & E. Corp.[5]		San Joaquin Lt. & P. Corp.[6]		Southern Calif. Edison Co. Ltd.[7]		Utah Power & Lt. Co.[8]		Wash. Water Power Co.[9]	
	Current	10 Mos.	Current	10Mos.	†Current	‡9 Mos	*Current	*9 Mos.	†Current	†9 Mos.	Current	10 Mos.	†Current	†9Mos.	†Current	†9Mos.	†Current	†9Mos.
Ranges	389	3817	451	3986	102	822	423	3026	65	423	131	1199	230	2306	167	2134	263	1797
Water Heaters	144	1809	126	1225	10	154	289	1888	60	415	80	576	67	890	21	668	190	1298
Air Heaters, aux.	93	308	290	841			263	3127	35	695	53	195	54	860	34	490	86	537
Air Heaters, 220			65	380	17	100	104	589			51	319						
Refrigerators	140	3829	1930	27358	327	4673	2714	33038	800	6175	143	4499	3171	28111	325	6456	356	5823
Dishwashers	4	21	7	204			7	106			2	54			1	29		5
Washers	282	3070	1823	16677	542	4010	2427	21067	450	3060	285	2610	2557	18794	554	6158	522	3789
Ironers	24	330	387	3279	89	476	573	3928	75	510	33	603	374	2493	29	398	23	270
Vacuum Cleaners	60	746	510	5104	229	1974	2135	17751	250	1995	95	800	850	7904	185	2890	202	1688
Radios	747	5516	3237	27953	1357	6156	9528	71870	1100	8150	583	4551	4592	35045	847	9386	1602	9401
Mixers	19	421	176	1626			309	2826	125	1120	47	410	210	2058	47	1226	136	1308
Cookers, Casseroles	26	211	99	854					75	660	37	462	72	661	59	2456	397	3887
Irons	348	3596	707	6175					525	4175	310	2983	1255	8880	741	8219	717	6057
Waffle Irons	89	912	279	2239					175	1425	84	749	325	2781	165	2296	202	1545
Toasters	132	1336							400	2950	139	1220	475	4042	149	2986	394	3283
Table Stoves	105	1582	259	1811	845	7144			100	750	70	829	431	2214	382	5769	134	1431
Heating Pads	47	375	170	1092					75	855	56	329	91	1282	69	1298	147	944
Curling Irons											111	1120	39	333	82	1495		
Coffee Makers	162	1442	126	889					450	3065			426	2658	185	3035	409	3583
Sewing Machines	7	95					382	4027	85	740					107	1277	68	556
Clocks	95	766	305	2240					450	2875	132	1337	511	4259	170	2058	173	1990
Fans	16	1097	24	1192							11	1616	203	2227			91	2933
Floor Polishers															27	989		
Sun Lamps	10	71											27	214	2	64	5	45
Reflector Lamps	481	3373									225	1535			325	5309	770	8563
Miscellaneous Lamps	527	1875			607	5047									403	5107	866	6487
Yard Lights											56	516						
Misc. Small Appl.			215	2379					550	5025	109	929	592	5356				

SOURCES

[1] Figures compiled by Electric Equipment Sales Association. Include power company sales of all reporting dealers.

[2] Compiled by Los Angeles Bureau of Power and Light for territory served by that system.

[3] Combined dealer and company sales from report of Montana Power Co.

‡ Does not include dealer figures for two divisions for January and February, 1938.

[4] P. G. & E. reports sales of major appliances only based on accurate reports from dealers' accounts. Ranges, water heaters and air heaters include company and dealer sales. *Due to delays in compiling report current and total figures are always one month behind those figures of companies reported in other columns of this table.

[5] Gathered by Bureau of Radio and Electric Appliances of San Diego County. Estimated monthly sales figures used in this table: Miscellaneous figures includes fans, curling irons and sun lamps.

[6] Includes dealer reports from Midland Counties Public Service Corporation also. Compiled by Valley Electrical Supply Company.

[7] Includes reports from dealers on San Joaqin Valley system of company as well as Southern California areas served.

[8] Includes Utah Power & Light Company territory in Utah, Idaho and Wyoming. Also Western Colorado Power Company territory.

[9] Dealer sales only for Spokane and company territory. Company sales not included. Table stoves, grills included with cookers.

† October figures were not available at time of going to press.

EDITORIAL

Relief from PWA

IN A RECENT issue of *Collier's*, Secretary Ickes makes the statement that "there has been the erroneous impression, undoubtedly stimulated to a large degree by protesting private utilities, that PWA has encouraged, if it is not actually instigating, applications for municipal power projects. This is not now and never has been the fact." A little further on Mr. Ickes states that "in no instance will PWA attempt to induce municipalities to take over private utilities or to build plants in competition with them."

This latter public declaration of policy is heartening to the electrical industry. Unfortunately the industry has been suffering from the "delusion" which the Secretary of the Interior categorically denies in the first quotation. And why not? Any man engaged in private business or contemplating the organization of a business would certainly conclude that the furnishing of 40 per cent of his capital investment as an outright grant and 60 per cent in the form of a long-time, low-interest bearing loan was "encouraging."

Bonneville "Yardstick"

EXACTLY two weeks before the November elections, when 15 counties in Washington and one in Oregon were to vote on the formation of public utility districts, the Bonneville Administrator announced his so-called "objective" rate with a 2.5c top, a ½c bottom, a ¾c end and a 50c minimum. This rate, on its face lower than any existing rate in the territory (lower also than TVA rates), was issued obviously to fix these low figures in the minds of the voters. Whether it had that effect in influencing the vote in the seven districts which carried is of little moment now. The important fact is that the industry in Oregon and Washington, and for that matter in the entire Pacific Coast region, has been given a new domestic electric "yardstick" which the public may adopt as its conception of something that is equitable.

Hence an understanding of the rate and the philosophy back of it is essential. While Bonneville Administrator's announcement admitted that "at the start most public agencies will have to charge more than the 'objective' rate," it was nevertheless ballyhooed as "a mark for public bodies to shoot at, a standard which they can attain and exceed." The fact that public bodies could not be expected to reach this objective level at once was minimized. The announcement further emphasized that this resale schedule would not be expected to apply to private utility purchasers of Bonneville power, again with the obvious inference that only by going to public distribution of power could one expect to attain this ideal. The astute will recognize this as public ownership propaganda—many Northwest newspapers editorialized to that effect.

Fact is that this "objective" rate is to be a sort of base resale schedule, to which may be applied any multiplying factor up to two to give it flexibility to meet the varying conditions in any public utility district. The Bonneville administration recognizes, in common with everyone else familiar with the situation, that each public district must have sufficient revenue to meet its own set of costs which, in turn, will vary with local conditions. Most important of these conditions will be (1) the cost of the distribution system, whether the existing system is purchased or a new one built, and (2) the volume of bonds issued to acquire the properties, to provide working capital and to pay the 2.5 per cent financing charge of the underwriters.

Here is another point on which the public is not well informed: Whenever revenue bonds are urged as the best means of financing a district's entry into the power business, no mention is made of the fact that these bonds will carry an ironclad guarantee that the rates to be charged for service will be sufficient to meet the interest and sinking fund requirements prior to any other charges against the district's power business. The underwriters will see to that, knowing full well that such bonds would not be readily saleable without this safeguard. Thus any resale rate the Administrator may suggest or insist upon must necessarily be theoretical, since the bond-holders will legally have the last say.

Still another factor which the "objective" rate ignores is the item of taxes. Under existing domestic rates charged by private utilities in Portland, the cost of 500 kw.-hr. is $8.07; under the objective schedule this energy would cost $6.25. However, the Portland companies pay approximately 18 per cent of their gross revenues for taxes. Thus the $1.82 differential in favor of the objective rate shrinks to 36 cents when weight is given to the tax item.

Broadly speaking there is no harm in shooting at an "objective" or an "ideal" and perhaps there should be no reason why that set by the Bonneville Administration should not be reached in time by the private companies. Their rates have been

coming down steadily for the past 40 years and no one yet has dared to estimate where bottom is nor when it will be reached. As every utility man knows, this continuous reduction depends primarily on increasing use, a point which even Mr. Ross stresses at every opportunity. Use depends not so much upon the public's ability to pay for the energy, but more upon its ability to buy the necessary utilization appliances.

The point to be emphasized is that the Bonneville "objective" rate belongs in the realm of theory. It may be used as a point from which to figure. If those who are to do the figuring will recognize and meet the actualities involved in providing electric service and be honest enough to bring those actualities out into the open divorced from fine-spun theory, then the public may know and recognize the truth. Otherwise someone may be hurt.

"The Power to Tax—"

AMONG the "hidden" taxes about which the public knows little or nothing are those levied upon the utilities and passed on by them to their customers. While sincere efforts are being made to show the public just how big this indirect levy is, there is considerable doubt as to the effectiveness of the story. The public cares little about either the multiplicity of the tax-levying bodies or the variety of the taxes imposed. Because the power companies are big and apparently prosperous the public looks at them as fair game for the tax collector.

Until it is possible to impress upon utility customers that *their* pocketbooks are supplying the money and that every increase in taxes on the utilities means just that much less electricity, then there is little chance of relief from the increasing impositions. Such facts as those revealed by a study conducted by one Pacific Coast power company might shock the public into doing something. This company's records show that its annual average rate of increase in gross revenue for the last 25 years has been 7.78 per cent. During the same 25-year period the average annual rate of increase in taxes has been 15.4 per cent. Both curves approximate straight lines; but the tax curve has the steeper slope. At the point where the tax curve crosses the revenue curve, all the gross income would be required to pay taxes. If the present rates of increase continue, this would occur in 1964. Obviously this cannot happen because long before that fatal date the company would be bankrupt. That the present trend would produce such an occurrence is something the public does not know. It is simple proof of that old saying that "the power to tax is the power to destroy."

ELECTRICAL WEST

DEVOTED TO THE ECONOMIC PRODUCTION, TRANSMISSION AND DISTRIBUTION OF ELECTRIC POWER AND ITS APPLICATION TO INDUSTRY, COMMERCE, AGRICULTURE AND HOME IN THE PACIFIC EMPIRE, AND TO THE MARKETING OF EQUIPMENT AND APPLIANCES AND OTHER UTILIZATION DEVICES IN THAT AREA

"Non-Coms"

HUMBLE employees are much under the spotlight these days in the business of winning public favor. Upon them rest new responsibilities for carrying to the public a picture of utility and industry usefulness and sincerity.

Yet should not another group, that immediately above the average employee, look into its responsibility in this mutual problem? That great "non-commissioned" personnel of officials and department heads, often considered sacred and unreachable, should it not take stock of its job in the over-all responsibility of public relations? If it is true that employees represent the company in the eyes of the customer, then is it not equally true that each department head and official down to the foreman or straw boss represents the company in the eyes of the employees below him?

Can we expect employees to carry favorable impressions to literally millions of close friends if the boss himself violates any rules of fair play, discriminates in hiring and firing or bestows upon himself those hundreds of small favors and privileges that excite jealousy and undermine the loyalty of his followers? The company itself can shout from the housetops its benign purposes, its virtues, its fairmindedness; but the employee, who always has the last word, stinging from petty injustice or hurt by thoughtless belittlement, may whisper to his friends to the contrary. And his whispers count more than a thousand official speeches.

In this serious need for better public respect and support, how much of the distrust upon which the press and the politicians have played has sprung from the injured complaints of minor employees who have told their friends their troubles? Public relations should reach all the way through the structure of an organization, if they are to be any more than a false face to wear before the public.

Management, with so much at stake, might well develop a code of ethics or practices for its lieutenants, sergeants and corporals. The army of employees which they direct should not have mutiny in their hearts as they face the criticism of the world together. Even the hard-boiled sergeant must have the respect, as well as the obedience, of his men in facing a crisis together.

Fig. 1—Rotary-miller electractor preparing seed bed for lawn. Note tilled condition of soil between tractor and fence, a once-over operation 4 in. deep

Electractors

University of California develops a couple of models

By K. R. FROST
University of California
Division of Agricultural Engineering

The practicability of using small electric motors as power units for garden tractors has interested agricultural engineers throughout the world. Machines have actually been built in the U. S., France, Russia, Germany, England and New Zealand; and in one case a unit, although originally intended as an experiment by an electric mower company and local gardener, has been operating for eight years.

No conclusive proof of the value of such tractors has, however, been obtained. The University of California's laboratory at Davis accordingly tried its hand. Two tractors, varying widely in design, size and method of cultivation, comprised its efforts.

The first tractor (Figs. 1 and 2) was powered with a 1½-h.p., 220-volt, variable-speed, brush-shifting, single-phase, a.c. motor. The electric cable serving the unit automatically winds on a spring-operated reel which maintains uniform tension on the cable.

The motor drives the traction wheels through a set of spur and worm gears; bevel gears drive the rotating miller for tilling the soil. By shifting the brushes on the motor, the tractor can be operated in either direction. Handles can be turned half-way around so that the digging unit will either lead or follow the motor. Thus it is possible to till close to or under vines and shrubs. Rotating picks are double-pointed and dig equally well in either direction.

Trial tests showed that this tractor can cultivate 4 in. deep at a speed of 0.7 m.p.h. Power consumption varies from 1½ to 2½ kw., depending upon soil conditions. During operation, the tractor has given no trouble: it has broken up and pulverized several yard plots, leaving the soil in a mulched condition for seeding. The machine should, however, be powered with a 2- or even 3-hp. motor.

Latest work on electric tractors has been concentrated on a small, one-wheel cultivator powered with a ¾-h.p. motor installed in the center of the drive-wheel (Figs. 3 and 4). The wheel rotates about the stator of the motor, which is bolted to the tractor frame. The motor is a 110-volt capacitor-start, induction-run type with a reversing switch. It is equipped with a thermal protection to prevent overheating and an overload switch which permits heavy starting current but protects against continuous overload. Power is transmitted through a three-conductor extension cord 250 ft. long. As yet, no system has been devised for handling this cable; but either a trolley or a spring-reel may be used. In order to protect the operator against shock, the machine is grounded through one of the wires.

Speed reduction for this tractor has been obtained (1) by driving an auxiliary shaft by V-belt from the motor; (2) by sprocket and chain to a pinion shaft and (3) by spur action to internal ring-gear mounted in the drive wheel. Forward speed is about 1.3 m.p.h. This can be increased by changing the pitch diameter of an adjustable pulley on the motor and changing belts.

Control handles and cultivator shovels are mounted at the rear. Five shovels are clamped to a horizontal tool bar, to the ends of which are attached depth-gage wheels. Reversing and overload switches are mounted on the handles, readily accessible to the operator.

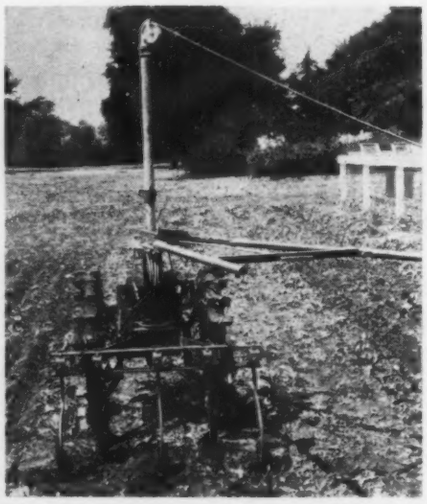
A draw-bar test of this tractor was run by pulling a small wagon equipped with a dynamometer. Speed, pull and electric power were measured as in Table I.

Because of the high cost per unit and the necessary transmission lines, university engineers concerned themselves entirely with the development of small units. However, results determined from tests of these units can, with certain modifications, be applied to larger units.

TABLE I

Run	Watts	El. H.p. Input	Draw-bar Pull (lb.)	Time for 50 sec.	Draw-bar H.p.	Over-all Efficiency (%)
1	700	0.94	92	39	0.214	22.8
2	630	0.84	82	27	0.28	32.7
3	850	1	144.5	35.8	0.37	36.6

Fig. 2—Electractor, with rotating miller replaced by shovels, cultivating young sugar beets



Soil Sterilizer

An Oregon farmer invents a switch for varying the load

By BEN W. FABER
Portland General Electric Co.
Hillsbodo, Ore.

It took a farmer, Walt Huntley, of near Hillsboro, Ore., to develop a switch which is exceptionally suitable for varying the load on an electric soil sterilizer. After the power company had given him a demonstration of soil sterilizing in a small box-type sterilizer, Huntley was sold on the idea. But he saw plenty of room for improvement.

RURAL LOADBUILDING

And Huntley improved the equipment to such an extent that last year he electrically sterilized all the soil used in 1,500 flats, or about 750 cu.yd. Cost of the electricity was 7c per cu.yd.

The sterilizer consists of 14-gage metal plates spaced about 3½ in. apart in a box. The soil acts as a conductor for the electricity. The type and amounts of salts in the soil materially affect the amount of current that the sterilizer will pull. If the current flow is too great for the wiring and switch capacity, then steps must be taken to lower the load.

One way of doing this is to space the plates farther apart. Where a box is built up, however, moving the plates is impractical. Huntley therefore arranged a rotary switch in such manner that various combinations of plates could be connected. Thus one connection permitted the current to flow between the middle plate direct to the outside plate without any electrical connection to the other plates. Another connection skipped every other plate.

The average temperature attained in the soil was from 180 to 190 deg. F. Average time for a batch was from 1 to 1½ hr.

The sterilizing eliminated practically all weeding and left the soil in better shape for planting. This is an important contribution when you consider that the weeding of 1,500 flats involves over 160,000 plants.

Figs. 3 and 4—(Top) Front view of single-wheel electractor, showing belt and chain drive traction wheel, controls and front tool bar. (Bottom) Side view of single-wheel tractor

CREA

Studies applications which will help the farmer save money

Electrical applications that will save the farmer money or increase his efficiency were described at the fall meeting of the California CREA at Fresno, when progress reports on projects sponsored by the committee were made by experts who head up the experimental work. Highlights from the reports include the following:

Under construction at Davis is an air-conditioned greenhouse where tests will be run on the effects of temperature and humidity on various types of plants. Gardenias will be the first variety tested.

Experiments are being conducted with evaporative-type coolers for poultry houses in hot summer climates. Initial results indicate an increased egg production and lower mortality in a test house where the hens are kept cool.

Field tests have definitely proved that the insect electrocutor developed under CREA sponsorship will control the grape leaf-hopper. This device has been approved by the California Industrial Accident Commission when it is installed 8 ft. above the ground. An installation of this equipment will be one of the features of the University of California's exhibit at the Golden Gate Exposition.

Soon to be published is a report on air conditioning controls prepared as a result of studies conducted by Prof. B. M. Woods. A new type evaporative cooler is also being built as a part of the project for air conditioning farm homes.

A study will soon be available showing the energy used on California dairy farms. This will show the kw.-hr. per cow per month for a variety of electrical applications.

Experiments are being conducted to determine satisfactory methods for cooling eggs on the farm so as to improve their quality.

Several projects were scheduled for experimental work in 1939. These include continuation of the work on the air-conditioned greenhouse, light and insects, egg cooling, air conditioning, energy studies, dairy sterilizers, and in addition, a study of dehydration of fruits, and experimental work with the newly developed sterilamp for control of bacterial growth and moulds in cheese. Also a study will be made of let-go current values in connection with electric shocks.

U. of C.'s insect electrocutor exhibit. First tests have proved that the electrocutor will control grape leaf-hoppers

LATEST DEVELOPMENTS in rural electrification will be presented to power-company rural specialists and others at the annual three-day rural electric short course to be held by the California CREA and the University of California College of Agriculture at Davis, Calif., Jan. 9-11, 1939. Subjects to be discussed include: dehydration of fruits and walnuts, insect electrocutors as applied to vineyards, orchard sprinkling, domestic water pumps, water softeners, handling of eggs on the farm, domestic lighting, evaporative coolers, dairy sterilizers, photocell applications, blowers for frost control and poultry scalders and washers. Plans for the course are being handled by Ben D. Moses and J. R. Tavernetti.

Left: H. B. Walker, professor of agricultural engineering, University of California, Davis, has been reelected chairman of the California Committee on the Relation of Electricity to Agriculture. Right: J. J. Deuel, head of the law and utilities department of the California Farm Bureau Federation, handles the relations of farmers with the power companies

Maintenance

Engineers sign up for a six-course educational series

One hundred and ninety-one members of the Electrical Maintenance Engineers' Assn. of Southern California have signed up for a series of six educational courses offered by the Los Angeles Board of Education and various manufacturers. The series will run a total of 36 weeks.

According to plans announced by C. M. Hoag, chairman of the association's educational committee, and Walter E. Coburn, of the board of education, classes will meet two evenings per week. Courses will run consecutively or concurrently.

Subjects to be covered in the courses and the length of time devoted to each subject will be as follows:

First course (11 weeks)—Wire-gage measurements, 2 hr.; current electricity, 4; properties of matter, Electron Theory, 2; resistance, 2; Ohm's Law, 6; series and parallel circuits, 2; electrical work and power, 4; feeders, sub-feeders and branch circuits, 4; magnetism, 2; electro-magnetism, 2; electro-magnetic induction, 2; ammeters and voltmeters, 4; measurement of resistances, 2; armatures, 2; storage batteries, 4.

Second course (five weeks)—Vector diagrams, 2 hr.; resistance and inductance, 2; reactance and impedance, 2; trigonometric functions as applied to a.c. circuits, 2; power in a.c. circuits, 4; power and power-factor problems, 4; transformer connections, 4.

Third course (five weeks)—calculate winding for split-phase motor stator, 4 hr.; calculate winding for repulsion motor stator, 2; calculate winding for three-phase motor stator, 6; calculate winding for three-phase motor rotor, 2; motor controls, 6.

Fourth course (2½ weeks) — Calculate winding for d.c. motor—fields, 4 hr.; calculate winding for d.c. motor—armature, 6.

Fifth course (2½ weeks) — Synchronous motors, 4 hr.; synchronous motor controls, 2; review of polyphase circuits, 2; California Electrical Safety Orders and panel discussion, 2.

Sixth course (10 weeks)—Explosion-proof equipment, 2 hr.; vapor-proof equipment, 2; call systems, 4; rheostats and controllers, 4; photo-electric cells—control relays, 2; photo-electric cells—counting relays, 2; plant lighting layouts, 2; lighting units, 2; motor-generators, converters, rectifiers, 8; relays, 4; estimating material costs, 4; estimating labor costs, 4.

IES Committees

Are appointed to handle details for the 1939 convention

Robert Dummel, chairman of the San Francisco-Bay Cities Section, Illuminating Engineering Society, last month appointed committees to handle details of the IES national convention in San Francisco, Aug. 21-25, 1939.

O. R. Doerr, Pacific Gas and Electric Co., was named general chairman of the convention committee and head of the executive committee. Working with him will be John Erikson, secretary of the section, and Fred Wellhouse, convention-committee treasurer. Other members of the executive committee are Dr. Leland H. Brown, Leo Gianini, Roy Myers and Dummel.

Sub-committee chairmen are: William P. Bear, hotel; E. C. Wood, transportation; Doerr, finance; Gilbert Trosper, entertainment; William A. Cyr, publicity; H. A. Gardner, attendance, and Gianini, lighting and decoration. Nate Graves is special assistant to O. P. Cleaver, chairman of the national progress committee of the IES.

Set aside as Illuminating Engineers' day at the Golden Gate Exposition is Aug. 21. The convention itself will be held at the Fairmont Hotel. Because of the extensive electrical exhibits at the fair, no exhibit has been planned for the convention itself. The Southern California Section will offer eastern visitors a tour of Los Angeles as part of the convention trip.

Brief

Contractors give legal basis for bid depositories

Because the bid depositories of electrical contractors and other construction groups have been subjected to scrutiny by Department of Interior investigators, Attorney Walter J. Walsh has prepared a brief, submitted to PWA, setting forth the legal basis upon which the San Francisco electrical contractors' depository operates.

Citing the California Unfair Practices Act, Walsh directed attention to the clause stating, "Where a particular trade or industry, of which the person, firm or corporation complained against as a member, has an established cost survey for the locality and vicinity in which the offense is committed, the said cost survey shall be deemed competent evidence to be used in proving the cost of the person, firm or corporation complained against . . . ."

Walsh also made a point of the fact that the depository in San Francisco has been set up as a separate non-profit corporation. Its exact purposes are outlined in the articles of incorporation. Briefly, these are: To bring to the industry the benefit of the California Fair Trade Act, Unfair Practices Act and similar laws; to promote better relations between members of the industry, and to own such property as is necessary for the operation of its depository. Any surplus funds derived from the depositing of bids at the fee set are used for the prosecution of contractors who violate the Unfair Practices Act by selling below cost.

Report

National Industrial Service Assn. advises motor dealers

Western motor dealers have been studying with interest the report on distribution of electric motor and control equipment issued by the trade relations committee of the National Industrial Service Assn.

The report sets forth the qualifications of a franchised dealer as one entitled to exclusive territory and an adequate discount to cover cost of engineering, sales and services. The manufacturer, in turn, is entitled to the dealer's allegiance, sales - engineering coverage of the territory and facilities for prompt and efficient servicing of equipment. The motor brokers are not entitled to the full discount of the franchise distributor but only to a broker's commission. "Manufacturers who do not give sufficient margin," the report says, "or who do not give an exclusive territory, are only entitled to a brokerage service such as a member is free to render to any other manufacturer."

Blame for cut-throat competition in motors is placed by the committee on the broker or multi-franchise type of distribution. Recommendation is that members, so far as practicable, arrange for exclusive representation of the best available lines which will provide a fair contract with an adequate margin.

IAEI

Central California Chapter discusses wiring problems at Visalia

Uniform understanding of several problems in wiring and installation were sought by the Central California Chapter, International Assn. of Electrical Inspectors, at its Nov. 14 meeting at Visalia. C. T. Coyle, Fresno city inspector, chairman, presided and reported on the Long Beach convention of the Southwestern section.

By-laws proposed by the IAEI's executive council were discussed, and the officers empowered to prepare by-laws on the model and submit them at the next meeting.

Mark Webster, Fresno inspector, discussed sections of the NECode pertaining to residence construction.

J. W. Cary and D. A. Demanty were appointed to select portions of the NECode for discussion at the next meeting in Lindsay at a date not yet determined. After the session, the inspectors joined the large group attending the first PCEA regional meeting.

Electrical Meters and Measurements

By H. J. PHILLIP*

A STUDY of the records of the special test section of any electric utility will disclose the fact that in many instances the maintenance engineers of industrial plants are not properly equipped with the necessary instruments for electrical tests and thorough methods of measurements.

In the not too distant past electrical instruments and measurements were primarily considered part of the tools and equipment for the design and research engineer. Very few instruments were available at that time for use in the field, inasmuch as costs were excessive and personnel trained in the use of testing equipment, or capable of analyzing the results, was scarce. Therefore, the tendency on the part of industrial and commercial establishments was to rely solely upon the resourcefulness and ingenuity of their maintenance men to keep their production interruptions at a minimum.

Ever since the method of driving equipment by individual motor drive or in groups has been in existence, there has been a need of maintenance. Only within a comparatively short space of time has the maintenance of this equipment been treated as an engineering problem. The reason for this change is undoubtedly due to industry's pride in mass production. The present-day industrial plant of any nature has become a complex machine, giving rise to numerous individual problems with interlocking processes, one dependent upon another for the smooth and uninterrupted progress from raw material to finished product.

Because of the fact that for the past number of years, and according to the present trend, more attention is being paid to the efficiency of individual machines which vitally affect over-all efficiencies in any plant, considerable expenditures are made annually in tools and equipment to facilitate the handling of equipment when shut-down periods occur. Why, then, should not an expenditure be made in testing and measuring equipment that in all probability would tend to keep costly interruptions at a minimum?

We find in the major industries, as well as smaller concerns, that new and original applications exist. These applications were not taken into consideration by the designer of the equipment or the motor; therefore, they become a special engineering problem for the maintenance engineer and his staff. He, then, finds himself not only the guardian of uninterrupted production, but also a designer in using standard machines and equipment for special applications to his specific needs.

The maintenance engineering section can no longer exist under conditions which prevailed not so long ago, namely, on the basis of a guess—good though it may be—as to the cause of any specific breakdown or interruption. And due to the fact that we who have the responsibility for proper maintenance are not permitted the out-moded cut, try and guess method, it is necessary that essential equipment for tests and measurements be placed in our hands. The type and quantity of testing equipment necessary must be answered by the individual engineer. The governing factor with respect to selection is dependent upon the individual problems of the plant. We can safely assume that any plant maintaining its own service facilities should have at least the commonly accepted standard portable instruments, such as a voltmeter of sufficient range to cover voltages used in the plant; one or more ammeters, preferably of the split-core type, to cover all loads within the plant; and in many instances, a plant of this type can afford one or more wattmeters with sufficient current and potential transformers to enable its maintenance crew to obtain demands at any point it may desire.

In the past few years instrument manufacturers have placed on the market various instruments consolidated in groups on a single panel. All internal connections are permanently made, thus leaving relatively few test leads and reducing the possibility of false connections and false readings to a minimum. Most of these so-called analyzers contain a volt and ammeter, with their respective switches, a wattmeter and a power-factor meter. By the addition of auxiliary transformers, these instruments will generally fulfill the needs of any plant.

To this group of instruments may be added graphic or curve-drawing instruments, as well as a megger or other type of resistance-measuring instruments. It may be said here that insulation-resistance measurements may be of more value in certain specific plants than any other single measurement. Certain highly specialized industries can utilize and have a need of accurate speed-measuring equipment.

The question now arises: What shall we do with our testing and measuring equipment? We know that costly instruments of this nature do no one any good sitting on a shelf in the shop, utilized only when trouble develops; therefore, it should be the responsibility of the maintenance engineer to set up and put into effect methodical systems of routine testing. This being done, a running check is continually carried on and apparently unaccountable changes in performance of motors can be analyzed. Necessary steps can be taken to correct faults that may develop, thus reducing the possibility of costly shut-downs.

In the larger industries and commercial plants it may be advisable to install instruments permanently on key machines, the selection and number of these being, of course, dependent upon the kind of installation, the influence of various production schedules as related to power cost and the flexibility of the specific plant in regard to changes from one rate schedule to another.

Graphic instruments of the portable or permanently installed type are of particular value in large industrial and commercial enterprises. This is especially true where power-cost studies are constantly carried on. Generally speaking, from a power-cost standpoint, graphic or integrating wattmeters are the most valuable. However, many specialized industries may find that graphic voltmeters, etc., may be more valuable. By the proper utilization of the charts from these instruments, much can be learned that will assist the maintenance engineer to be ahead of the shut-down.

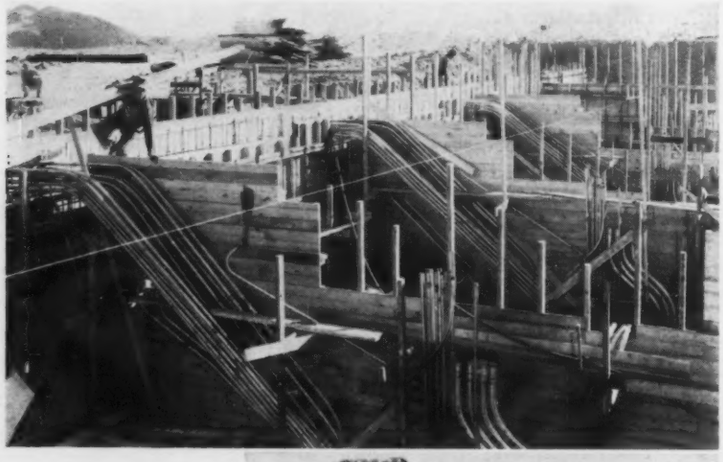
The well organized maintenance-engineering section, with selected measuring instruments and with a definite, routine testing program in operation, will decrease the chances of costly shut-downs which may have everyone from the general manager to the office boy on your neck. It is the cheapest form of insurance that can possibly be obtained.

* Paper presented before the Electrical Maintenance Engineers' Assn. of Southern California.

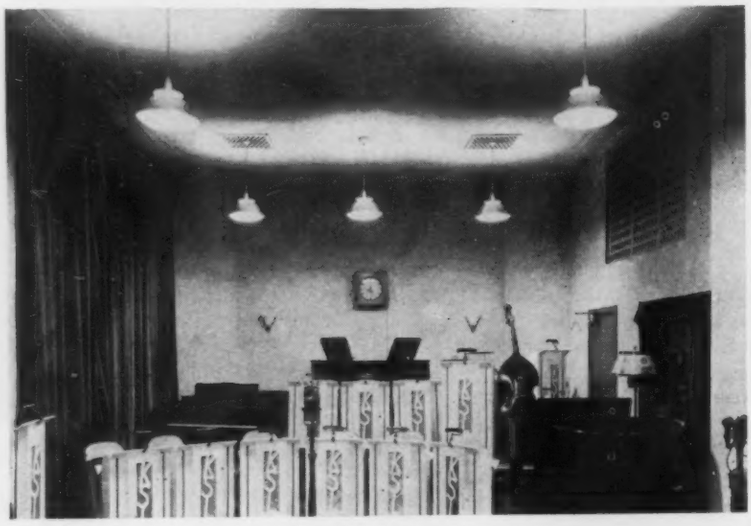
Contractor-Jobs in the Western States

So well did Arthur's of Huntington Park like the lighting service designed for its store by Southern California Edison that when Jack Buck, store designer, laid out the above new store for San Bernardino he increased lighting. Windows with louvered troughs have 76 150-watt lamps, delivering 160 ft.-candles. High-intensity blue Lumenarc in a trough under the continuous markee spills 64 ft.-candles to the sidewalk. Three bulls-eyes punch extra light down at the entrance under the clock. Silhouetted block letters in neon above the marquee add to the glory of this super jewelry establishment. E. L. McAdams, San Bernardino, installed the job

Above: Skylights at Federal Savings, in San Diego, are concealed by opal-glass panels above which are two high-bay 1,000-watt units. With 28-ft. ceilings, intensity is 12 ft.-candles at desk level. Gill Electric installed. A. I. Benedict engineered

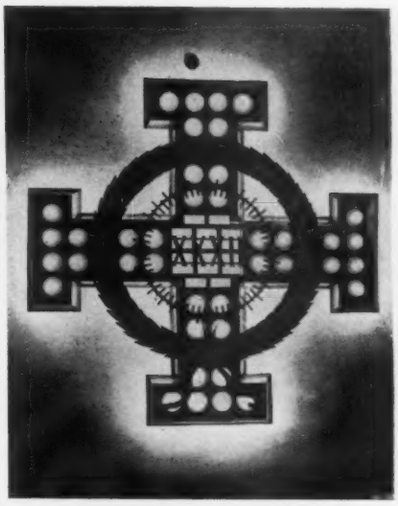


Above: All threading and bending of conduit for Metropolitan Water District pumping stations was done by H. H. Walker Co. on platforms then lowered to the forms, shown above. Power tools (right) and powerful muscles cooperated

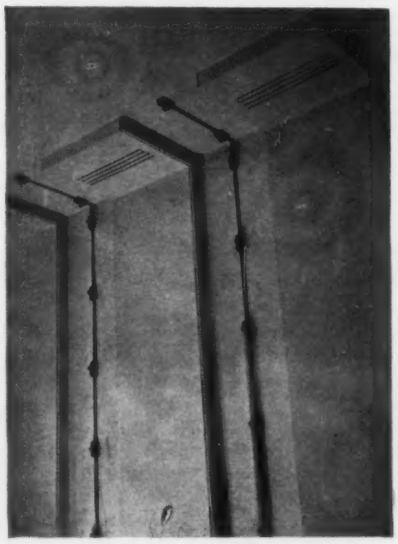


Left: KSL, Salt Lake City station, needed non-resonant fixtures. Capital Electric Co. installed eight Westinghouse Storelites because accoustical ceiling gave poor reflection. Results: 40 ft.-candles on music stands. Offices were relighted with 14 aluminum fixtures of the same make but totally indirect

Interior of Arthur's is lighted to 85 ft-candles on counters by 2,800 watts in two ceiling coves; four 500-watt special Solar direct-indirect units; two bulls-eyes in the ceiling, each with three 100-watt lamps behind opal glass; 2,200 watts in the troughs along the walls, and other incidental lighting



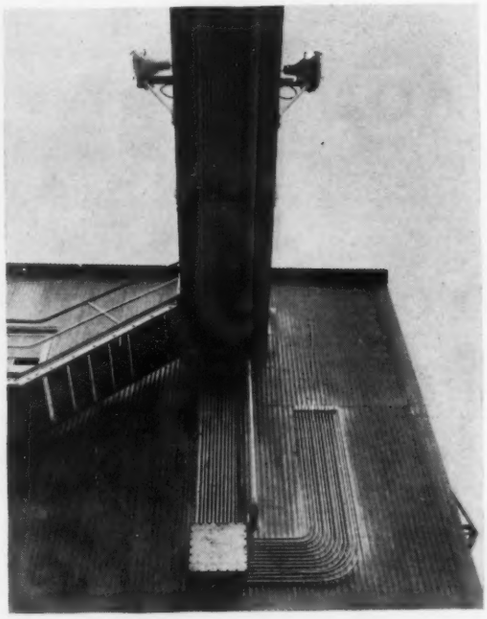
Above: Symbolic ceiling fixture in new Scottish Rite temple, Fresno, designed by Carl Wolf, installed by L. G. Jeffrey, combines color, indirect and direct lighting, under separate control for ritualistic effects



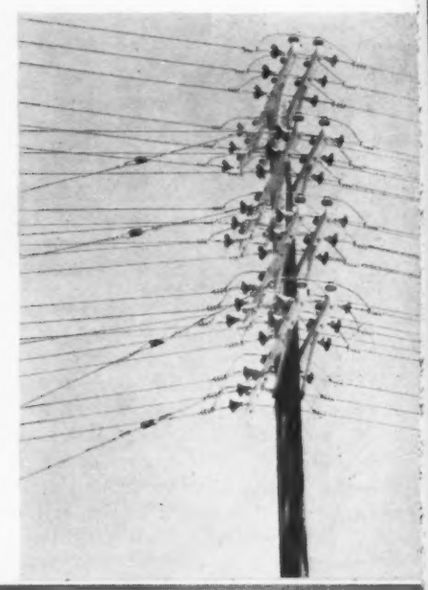
Above: Lumiline lamps on Wiremold installed behind glass panel in Arden store, Salt Lake City, by Wolter Electric Co. Window lighting of 12 kw. gets attention

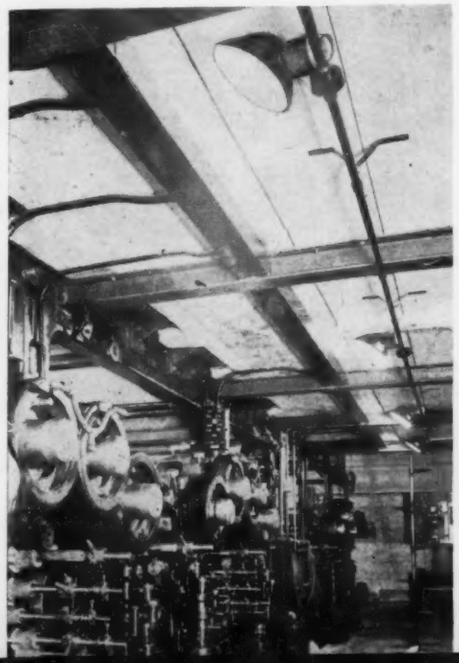
Below: Difficult low-ceiling lighting problem solved by California Electric Works, San Diego, by using angle sign reflectors to illumine lower deck of new presses at San Diego Sun

Below: Nice pipe work for lighting distribution at West-Vaco Chlorine Products Co., Newark, Calif., installed by Pacific Electric Motor Co., Oakland. Conduit racked under walk connecting two buildings over a driveway. Note floodlights to illuminate the yard

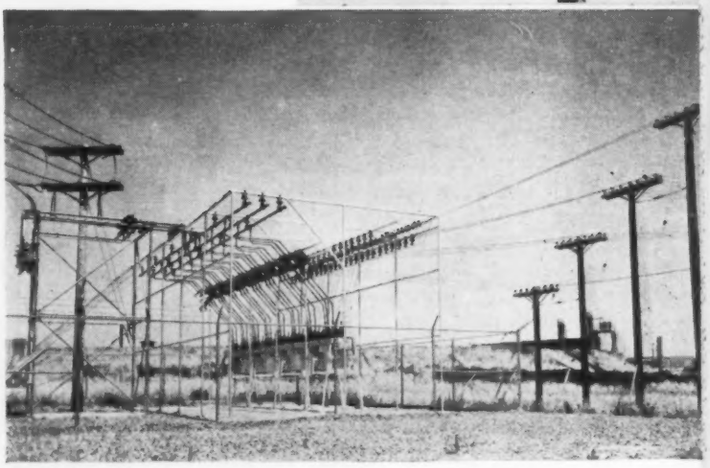


Below: Precision workmanship on this pole-top carried the conductors in a loop continuously without break from the substation (below) to the centers of distribution





Unique substation and distribution system at Avon, Calif., plant of Associated Oil Co. designed by M. A. de Lew, installed by H. S. Tittle Co. Eight circuits at 2,200 volts are fed through buses to 850-amp. switches. Cut to length, 3,600 ft., 2/0 copper conductors leave the potheads and are carried unjointed to their destination. The four poles at right are stepped to separate the feeders before bringing them together on the pole shown above. Substation structure is welded from pipe, and guy wires are carried through top pipe to the outside member



What Cost

VOLTAGE drop is costing everyone money. What's to be done about it? Legislation cannot require copper carrying capacity enough to reduce it, because legislation cannot go beyond safety to life and property. Voltage drop seldom involves safety. It does involve the efficiency and economy of an installation. And as long as it exists the customer is paying for current from which he gets no benefit; the equipment operates at less than its efficiency and brings complaints to manufacturers, dealers and utilities, and the entire industry suffers.

For many years the subject of voltage drop was not considered one of the requirements of the National Electric Code. Probably this was because a conductor approved for a specific load, regardless of the length of the circuit run, did not present a hazard to life or property. But today the introduction and use of every conceivable kind of electrical appliance, material or device has created a condition wherein the sale and satisfactory performance of appliances are entirely dependent upon each appliance's receiving full rated voltage at the terminals of the equipment.

Electrical appliances and devices are designed and constructed for a specific purpose and, in most instances, speedy and efficient operation. It is practically impossible to obtain these conditions unless they are receiving their full rated voltages.

Insufficient copper or wiring is the bottleneck for successful sales and satisfied customers. Many kinds of appliances have been discarded for their inefficient operation, slowness or generally unsatisfactory performance when the fault was not with them but with the wiring.

The electrical contractor, utility or individual furnishing the wiring for appliances is mostly interested in installing this work at a minimum cost of both labor and materials. Unless there is a mandatory requirement limiting the amount of voltage drop, this particular phase of the installation is given little consideration. Suppose, for example, an 8-kw. electric range requiring 35 amp. at 115-230 volts is to be installed in an apartment building. The contractor doesn't care whether this range is to go on the first floor or the 18th floor, because No. 8 wire is approved for 35 amp. regardless of the length of run. But this is a very important factor in the successful operation of the range.

Article 220, Section 2201, NECode, covering the subject of feeders, is a step in the right direction, even though it is only a recommendation suggesting not more than 3% voltage drop in the feeder wiring. For a long time it was thought that a wiring installation was adequately designed when the over-all installation was designed for a 3% voltage drop—1% in the feeders and 2% in the circuit wiring. This thinking is now out-moded, however. The public has become light conscious, and this recommendation, when used to meet illumination needs, results in a 10% loss in light and a 5½% loss in the cost of energy.

It used to be that voltage-drop tables and the methods of computing these were carried over from the days of single-phase two- or three-wire circuits. Today, distribution systems have changed, and the factors for the computation of voltage drop for the various classes of service are somewhat modified. In dense load centers it is now the tendency to install a three-phase, four-wire, 120-208-volt, star-connected secondary network or feeder system. This results in many different types of circuits and wiring systems, all recognized and approved in the 1937 edition of the NECode and now classified as multiphase branch circuits.

This new three-phase, four-wire, star-connected distribution system is used by the serving utility to supply either new or old electrical installations. It is the proper use of the various types of multiphase feeders and circuits that I wish to discuss.

In order that an electrical inspector may properly suggest or enforce any of the electrical requirements governing him, he should have some idea of the differences in voltage drop for the various types of circuits supplied from this kind of system.

• From a paper presented at the convention of the Southwestern Section, IAEI in Long Beach, Calif., Oct. 11, 1938.

Voltage Drop?

By HAROLD L. GERBER*

For the purpose of this paper, I assume that the circuits and feeders discussed are not of extremely long runs, that the conductors are installed in conduit or metal raceway and that the circuits are operating close to or at unity power-factor.

Did you ever stop to consider that only a short while ago, 90 ft. was a not uncommon circuit length? A 660-watt non-inductive load could, with allowance of 2% voltage drop and in accordance with the old code, be served by that length of No. 14 wire. Today the picture is different. The code now permits 15 amp. to be carried on No. 14 wire; but this limits the length of a fully loaded circuit to 25½ ft. This is not in feet from the panel-board; rather it is the length of wire after connection to the panel-board protection.

Voltage drop on lighting circuits in small homes is not a serious factor. But voltage drop on appliance circuits is. Toasters, irons and similar appliances are now in the 1-kw. classification; and when these plug receptacles are installed on lighting circuits it is little wonder that we lose patience waiting for the toast to brown and the coffee to percolate.

A 15-amp. load connected to No. 14 wire cannot be installed for a distance of more than 15 ft. without exceeding 1% voltage drop and an additional 1% for each extra 15 ft. We in the electrical industry are less concerned about wiring in our own homes than the majority of people. Because they are conscious of the loss, no matter how small, most people immediately replace a defective washer causing a small leak which does not cost more than a few cents a month additional water-service charge. But they seldom think that their watthour meter is installed at a point where the service conductors enter the building and that the potential coil of that particular meter is operating at the line voltage at that point on the circuit. In other words, where 120 volts enter the building, the meter measures the current passing through its coils at 120 volts. But you are using the same amount of current at 115 volts or less. And at the end of each year, this 5 or 7% loss in current represents a noticeable unnecessary expenditure. It means that from 5 to 7c of each dollar spent for electrical energy performs no useful work.

In commercial, industrial, school and office installations this excessive voltage drop deserves serious consideration. Where correct and sufficient illumination is needed, a proper wiring installation not only means a decided saving in energy loss but also means a difference in the sizes of fixtures necessary to provide a specific ft.-candle intensity. In many cases, fixtures of specific wattages are selected and ft.-candle intensity is computed on the manufacturer's curves or tables. When installed on circuits having insufficient copper capacity, however, the results are rather disappointing.

What has all this to do with multiphase lighting circuits? Simply this: The application of two and three-wire circuits and feeders to a polyphase distribution system has the effect of producing many of the results I have mentioned.

If a two-wire, 120-volt circuit is installed with a 2% voltage drop, a three-wire, single-phase or d.c. circuit of the same length and load per side of the two-wire circuit will, with balanced load, have only a 1% voltage drop. Not only is a three-wire circuit a considerable factor in voltage drop, but it also means a saving in conduit and wire sizes. So the universal tendency is to install three-wire circuits wherever possible. Three-wire circuits are an excellent installation on three-wire, single-phase distribution systems.

Did you know that because of voltage drop

Five to seven cents of each dollar spent for electrical energy performs no useful work?

Three-per-cent voltage drop reduces the light output of a lamp 10% and the amount of energy supplied 5½%?

In a 220-volt motor, a 10% voltage drop decreases the starting and maximum running torque 19%; increases slippage 23%; decreases full-load speed 1½%; decreases efficiency at full load 2 points; increases full-load current 11%; decreases starting current from 10 to 12%; increases temperature rise at full load from 7 to 8 deg. C.; decreases maximum over-load capacity 19%?

Contractors should tell their customers these facts.

If a three-wire circuit is connected to a three-phase, four-wire, star-connected secondary system, the voltage drop is 2%. This is due to the fact that a three-wire circuit of this type is really two single 120-volt circuits operating 120 electrical degrees apart; and under balanced load conditions, the neutral conductor carries the full load current of one side of the circuit.

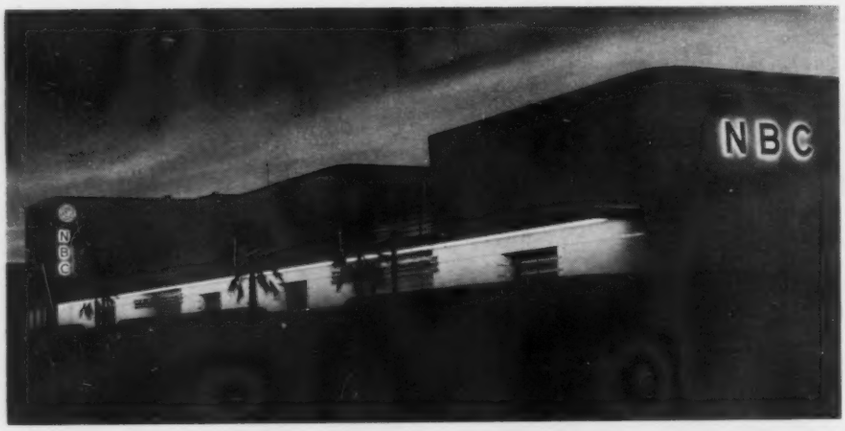
The most economical and practical installations to polyphase supply systems are three-phase, four-wire circuits. These result in even less voltage drop than the three-wire, single-phase systems.

In many buildings or industrial plants, feeders and circuits have been operating for years as single-phase lighting circuits with feeders and circuits heavily loaded. They have operated under diversity factors which have long since ceased to exist. Recently, however, the supply to these installations was cut over from a single-phase distribution system to the new polyphase secondary system. This resulted in the doubling of any voltage drop that existed in the old system. And you can well imagine what has happened to the efficiencies of the various lighting, heating and power circuits.

In motor circuits, little thought is given to voltage drop. The code provides minimum wire sizes for specific motor ratings and, regardless of the length of run, that is the size the contractor installs. It is interesting to note, however, just what happens to a 220-volt motor operating at a 10% voltage drop.

Manufacturers claim that motors will operate satisfactorily at either 10% high or low voltage. But at 10% low voltage, the starting and maximum running torque is decreased 19%; the slip is increased 23%; the full-load speed is decreased 1½%; the efficiency is decreased two points at full load; the power factor is increased from six points at half load to two points at full load; the full-load current is increased 11%; the starting current is decreased from 10 to 12%; the temperature rise at full load is increased from 7 to 8 deg. C., and the maximum overload capacity is decreased 19%.

If a little more thought were given to the advantages obtained from a slight increase in circuit and feeder wiring sizes and to the correct application of the circuits and feeders to their respective supply systems, a big saving would be made and the whole electrical industry would benefit. The utility would gain by the increase in current for the same connected load. The consumer would get more electrical energy for his money. The proper operation of appliances would boost the dealer's products and make satisfied customers.



A spectacular application of Zeon indirect lighting has been made on the marquee of the new NBC studios in Hollywood. Three partly recessed tubes of green, rose and blue, totaling 820 ft. in length, deliver about 16 ft.-candles of light at floor level. Sign and insignia are illuminated by gold and green Lumenarc mercury-vapor lighting

Fluorescent

The end of the story. This is about Zeon for outdoor use

Half the story of fluorescent lighting has already been told. The other half, covering the use of fluorescent tubular lighting over large areas by means of a technique familiar to sign and exterior decorative-lighting men, is equally important.

In the development of this fluorescent tubular lighting, manufacturers pooled their patents on a number of experimental sources. Original research by Claude-Paz et Silva produced 15 patents; by General Electric, 51; Westinghouse, 29; Claude Neon Lights, Inc., 31; Electrical Products Corp., 18, and other associated licensees, 11. Under the marketing agreement reached by these companies, G. E. and Westinghouse distribute the fluorescent tubes in lumiline sizes and styles. In the West, Electrical Products Corp. is distributor of what it calls Zeon, the fluorescent tubing applied to signs, marquees, building fronts, etc.

Originally, Electrical Products made several installations of interior lighting with long, continuous tubes. This is no longer permitted by the marketing agreement. Which, perhaps, is unfortunate in view of the special fluid effect possible with these tubes—an effect which could be carefully cultivated with benefit to the industry.

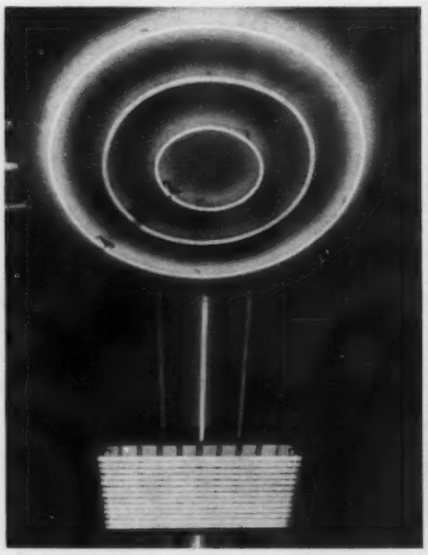
Zeon has, however, already made its appearance throughout the West in exterior lighting installations. The subtle pastel-colored signs punctuate the night street scene everywhere.

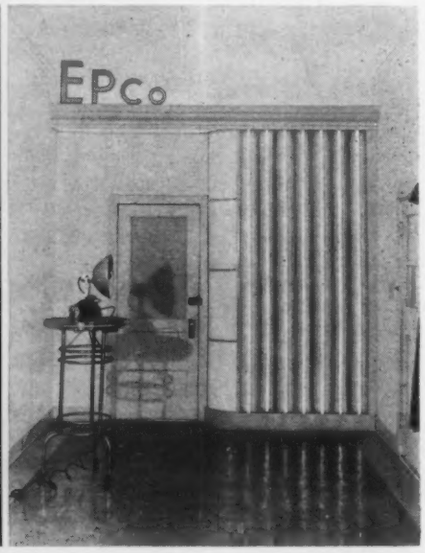
For the purpose of standardization and replacement of tubing, Corning Glass Works prepares all tubes and coats them with standard finishes of fluorescent material. These tubes are then fabricated—bent and shaped into letters or other designs—by Electrical Products Corp. Served by power-factor correcting transformers, this light source provides a desirable load. Single transformers can serve long lengths of tubing.

Now possible is the following range of colors, arbitrarily established as to their relative initial light value:

Source	Color	Light Value
Zeon	Warm white	100
Zeon	Canary yellow	81
Zeon	Jade green	75
Zeon	Old gold	58
Zeon	Turquoise blue	54
Zeon	Rose	47
Zeon	Daylight white	34
Zeon	Orchid	32
Neon	Orange red	28
Neon	Mercury blue	21
Neon	Mercury green	12

Color combinations may be derived by the blending of several tubes. For indirect illumination, most satisfactory results are obtained by using a reflecting surface of white, or a tinted background approximately the same color as that of the light sources.





Left: Illustrating some of the possibilities for architectural lighting with Zeon is this panel in the display room of Electrical Products Corp., Los Angeles. Several colors and designs are shown. Right: Another display showing architectural uses of the tubing in a cove (above door), behind structural glass and in reflector troughs

Lighting Shorts

Research fellowship; contractors' handbook; tool box

ILLUMINATION RESEARCH FELLOWSHIP involving a stipend of $800 and an expense account of $200 has been set up at Stanford University by a company operating retail stores. Object of the fellowship is "to further independent research on store lighting. It will involve the determination of the quantity of illumination and quality of lighting, both general and spectral, needed in retail stores; and the design of efficient illumination systems to meet these requirements."

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CONTRACTORS' HANDBOOK, carrying in full or in digest form practically all those California laws and regulations applicable to all classes of contractors, is now being distributed through the Supervisor of Documents in Sacramento. The book was approved by the Contractors' State License Board last year.

●

TOOL AND MATERIAL BOX which can be carried to the job and left there for the use of his men has been developed by Eugene Cartley, Bakersfield (Calif.) Electric Co. Made of heavy plywood, with galvanized iron reinforcing at the corners, the box is long enough to contain hickeys, pipe-threaders, etc. Rainproofing is achieved by a metal-covered top. Not only is the box a convenience to the workers, but it also saves in transportation of tools.

NEWS OF THE INDUSTRY

BONNEVILLE LINES AND SUBSTATIONS DISCLOSED

Bonneville Administrator J. D. Ross last month disclosed the route of the Bonneville network and the location of the principal substations. At the same time he announced that bids on $750,000 worth of switching apparatus and an addition to the Bonneville power house would soon be opened.

Substations for the initial Bonneville transmission lines (see map) will be erected in the vicinity of Vancouver, Aberdeen, Yakima, Kelso, Chehalis, Raymond, Cathlamet and North Bonneville, Wash.; The Dalles, Hood River, Oregon City, Salem, Albany and Eugene, Ore. The Portland substation will be in the St. John's area, and a similar site will be chosen near Grand Coulee Dam.

The initial transmission lines do not constitute the entire Bonneville system, Ross pointed out. Lower tension circuits—"finger lines"—will be erected into adjacent territory as rapidly as power applications are filed and funds made available.

Soon after the election he announced that he would immediately begin laying out distribution lines in Washington counties which voted to utilize Bonneville power. He said it might not be possible to reach San Juan County for some time, but that the plant would soon be serving customers in Clark, Skamania, Klickitat, Grays Harbor and Thurston Counties. Grant County is to be tapped when the Bonneville-Grand Coulee line is completed.

Meanwhile, land condemnation proceedings in Oregon and Washington were being speeded. Several suits were instituted to acquire right-of-way for transmission lines and tracts for substations. And in Washington, D.C., President Roosevelt put his stamp of approval on a $1,646,630 WPA project for clearing rights-of-way.

Bids on switching apparatus for the substations cover oil circuit breakers with interrupting capacities ranging from 500,000 to 2,500,000 volts and designed for operation on the 110,000- and 220,000-volt lines. They were opened Nov. 29. Bids on the powerhouse addition, which will house four additional generating units, were to be opened Dec. 9.

DIFFICULTIES which have beset the City of Cascade Locks, Ore., ever since it agreed to purchase 100 kw.-yr. of Bonneville power seemed about to dissipate last month. W. H. Duff, president of Peoples Light & Power Co., of which West Coast Power Co. is a subsidiary, said that agreement has been completed for the purchase of West Coast's transmission facilities in Cascade Locks and Pacific and Wahkiakum Counties, Wash. The city will pay $44,000 for facilities in its area, and the Bonneville Administration will buy an 11,000-volt line costing $155,000.

SAN DIEGO CONFERENCES BRING REDUCED RATES

Announced last month at the close of a series of conferences was a reduction in the domestic and commercial electric rates of San Diego Consolidated Gas & Electric Co. which will save customers $168,000 annually.

The new rates will be effective Jan. 1. They represent the fifth major reduction by the company in the past four years.

Joint negotiations between officials of the company, the City of San Diego and members of the California Railroad Commission brought about the reduction.

Small domestic and commercial users in the larger incorporated cities of the utility's territory will receive 93% of the total reduction. Public street-lighting rates for installations of sizes above 100 cp. in all cities were also lowered.

The new domestic rate schedule is as follows: First 12 kw.-hr., 90c; next 38, 3.5c per kw.-hr.; next 150, 2.4c per kw.-hr.; over 200, 1.5c per kw.-hr.

SIXTH GENERATOR of 82,500-kva. capacity has been installed at Boulder Dam and is now ready for operation. The unit is the second of this size to be put in service this year. Two more are now being manufactured and should be ready for operation next year.

SEVEN COUNTIES VOTE FOR PUD'S; EIGHT REJECT

Sweetness of private ownership's one-point victory in the Nov. 8 election was considerably tempered by the fact that 25 of the State of Washington's 39 counties have now voted to form public utility districts.

Final count showed that seven of the 15 counties in Oregon and Washington voting on the public ownership question favored formation of districts; eight were opposed.

Districts were favored in Clark, Skamania, Klickitat, Grant, Grays Harbor, Thurston and San Juan Counties, Wash. They were turned down in Adams, Columbia, Walla Walla, Yakima, King, Kitsap and Island Counties, Wash., and Wasco County, Ore.

Largest margins in favor of the PUDs were recorded in Grant County, 2 to 1, and in Grays Harbor County, 3 to 2. The plurality in Thurston County was only a few hundred votes.

In most counties in which the districts failed, substantial "no" pluralities were piled up. King County, Seattle county-seat and hub of the fight, voted roughly 10,600 against, 8,600 for. That the fight was not ended in this county, however, was indicated by the announcement of Harry Cheek, secretary of the Washington State Grange, that the proposition will be placed on the ballot in 1940.

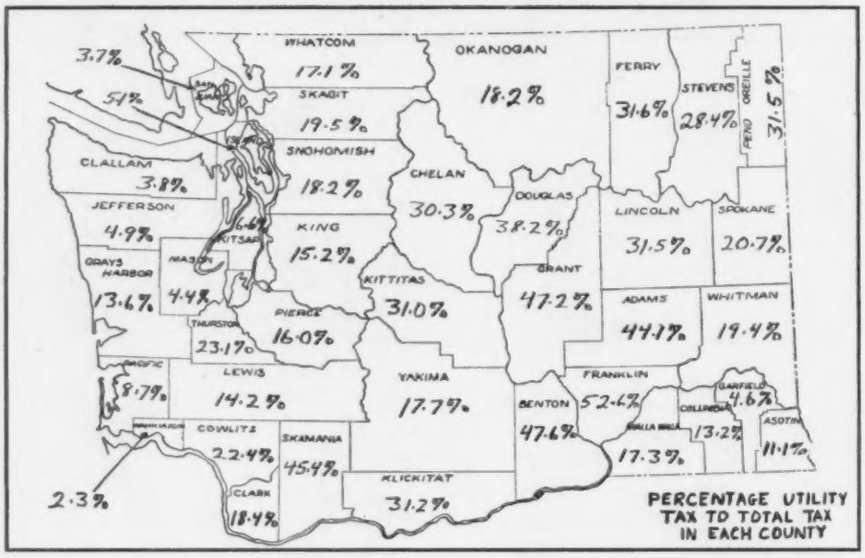
Another defeat for public ownership was registered in Truckee, Calif., where voters turned down a $60,000 bond issue which was to be coupled with a $54,000 PWA grant for the construction of a municipal generating plant. The vote was 1.5 to 1 against the issue. The Truckee municipal system purchases energy wholesale from Sierra Pacific Power Co.

Proposition No. 13 on the California ballot, a referendum on a revenue bond constitutional amendment passed by the state legislature, was snowed under by a vote of 1,350,861 "No" to 511,305 "Yes," a ratio of 2.6 to 1. This measure permitted the formation of public utility districts by any governmental subdivision with power to engage in any form of utility service financed by revenue bonds requiring only a simple majority vote for passage.

Outside of the elections, the following events took place:

(1) On Oct. 26 the Washington state supreme court upheld the Pacific County public utility district's condemnation proceedings against Willapa

Northwest Association Issues Analysis of Utility Taxes in State of Washington



Northwest Electric Light & Power Assn. recently released a report analyzing the 1937 taxes of private utility companies in the State of Washington. Object of the study is to show these taxes by classes of utilities, by kinds of taxes and, in the case of those taxes directly allocated to counties, by counties.

Results are summarized in the accompanying chart, which shows the percentage of all property and municipal taxes paid by utilities to the total of all property taxes for each county in the state, and in the table summarizing the taxes of the seven utility groups considered.

The report was compiled by Berkeley Snow, executive secretary of the association.

UTILITY TAXES FOR 1937 — STATE OF WASHINGTON*

Utility Groups	1937 Taxes Applicable to Counties: Operating Property	Non-Operating Property	Levies by Municipalities	Total Taxes in Counties	Other State Taxes	Total Taxes For State	Ratio of Other State Taxes to County Taxes (1)	Percentage of Municipal Levies and Other State Taxes to Total Taxes for State (2)
18 Steam Railroads	3,419,464.65	414,133.64	6,903.92	3,840,502.21	1,222,693.19	5,063,195.40	.318	24.3%
7 Electric Railways	63,616.08	6,430.61	33,000.37	103,047.06	81,728.35	184,775.41	.793	62.1%
18 Power Companies**	1,612,405.85	19,453.50	300,351.53	1,932,210.88	994,629.39	2,926,840.27	.514	44.2%
11 Gas Companies	209,731.02	1,219.97	66,622.51	277,573.50	87,958.86	365,532.36	.317	42.2%
14 Telephone Cos.	928,298.21	2,290.28	469,833.58	1,400,424.07	613,704.37	2,014,128.44	.438	53.8%
3 Telegraph Cos.	33,350.19		6,472.54	39,822.73	27,859.22	67,681.95	.700	50.7%
11 Water Companies	24,109.89		1,200.25	25,310.14	14,569.48	39,879.62	.575	40.0%
Total 82 Companies	6,290,975.89	443,528.00	884,386.70	7,618,890.59	3,043,142.86	10,662,033.45	.399	36.8%

*Data for this statement reported by 82 utility companies which represent 95% of all utility taxes levied in state of Washington.
** Includes Taxes paid on 3 Steam Heating Properties (Seattle, Spokane, Yakima) operated by these companies.
(1) Ratio of column 6 to column 5 expressed in Decimals.
(2) Percentage of Sum of columns 4 and 6 to column 7.

Electric Co. The court approved a superior court's previous action granting the district an order of necessity and public use and opening the way for a jury trial to fix the amount each district must pay for the utility's properties.

The Willapa company attacked the constitutionality of the 1931 grange power district law on several points. All but one of its seven objections against block condemnation proceedings were rejected, however. The court refused to pass on one point.

(2) On Nov. 14 Federal Judge E. E. Cushman ruled that he will hear in Tacoma the $5,000,000 condemnation suit brought by Public Utility District No. 1 of Cowlitz County against Washington Gas & Electric Co.

(3) The executive committee of the Washington State Grange instructed its attorneys to prepare for submission to the next state legislature a constitutional amendment taxing publicly owned utilities at the same rate as private utilities. At present, publicly owned systems are exempt from taxes under the state constitution.

Applications Filed For Elephant Butte Power

Received last month by the Bureau of Reclamation were applications for the purchase of power from the Elephant Butte power plant, which will be put into service late in 1940.

Schedule of rates, applicable to wholesale delivery of energy at primary distribution voltage, includes a demand charge of $1.25 per kw. of 30-min. integrated maximum demand per month and the following energy charges: first 50,000 kw.-hr. per month at 8 mills per kw.-hr.; next 50,000 kw.-hr. at 6 mills; next 200,000 at 5 mills; next 700,000 at 4 mills, and all over 1,000,000 at 3 mills.

The power plant, center of the Rio Grande project in New Mexico, will have an installed capacity of 24,000 kw. and an average annual output of approximately 90,000,000 kw.-hr.

●

CITY OF MCMINNVILLE, Ore., has dedicated an 1,800-hp. diesel addition to its municipal power system. The unit replaces two 600-hp. engines.

P. G. & E. Ruled Guilty of Discriminating Against CIO

Pacific Gas and Electric Co. last month filed with the National Labor Relations Board in Washington an answer to a trial examiner's ruling that it was guilty of influencing the collective-bargaining election in which the independent, incorporated California Gas & Electric Employees' Union was victorious over CIO's United Electrical, Radio & Machine Workers of America union by a 3 to 2 vote.

The examiner recommended that P. G. & E. stop "interfering with, restraining or coercing its employees in the exercise of their right to self-organization" and that it post notices stating that it would do this.

Highly significant in the examiner's order was his ruling that P. G. & E. is engaged in inter-state commerce and therefore comes under NLRB's jurisdiction. The report said in part:

"Among the materials used by the respondent in the operation of its business, include transformers, cable switches, incandescent lamps, miscella-

neous hardware, saddle sleeves and braces. The percentage of the materials mentioned, which are shipped into California from states outside of California, range from 10 to 90%.

"The respondent company furnishes the sole practical commercial supply of electric energy to the area in which it operates, and it can readily be seen that a shut-down of its operations would have a literally catastrophic effect on industry throughout the entire area. Specifically, the evidence discloses: (1) that all radio, telegraph and telephone communications would be seriously curtailed and, in some instances, completely stopped; (2) that navigation in and out of San Francisco Bay and along the California coast would be placed in peril through curtailed operations of fog horns and light signals; (3) that handling of cargo along docks at San Francisco would come to a standstill, and operation of signalling systems on the Southern Pacific and Western Pacific Railroads would be seriously curtailed and, in some instances, entirely impractical. All of these mentioned operations are directly involved in commerce among the several states and with foreign countries."

●

First Colorado-Big Thompson Construction Contract Awarded

First contract for construction work on the Colorado-Big Thompson project was awarded last month to Warner Construction Co., Chicago, on its bid of $4,226,206. The contract covers the building of both the Green Mountain Dam and the Green Mountain Power Plant, located on the Blue River about 16 mi. southeast of Kremmling, Colo.

The dam will be 270 ft. high with a crest length of about 1,300 ft. and a top width of 35 ft. It will be the second highest and largest earth and rockfill dam in the U.S. Only San Gabriel Dam No. 1 in California will exceed it.

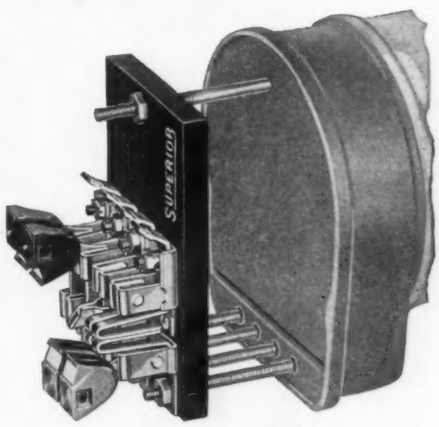
Downstream from the dam on the right bank of the Blue River will be the power house, a reinforced concrete structure housing two main generating units of 12,000 kva. each.

The dam and power plant are two of the principal construction features of the project, designed to supply supplemental water for 615,000 acres of land on the eastern slope of the continental divide in northeastern Colorado by diversion of surplus water from the headwaters of the Colorado River on the Western slope. The Green Mountain Dam will form a reservoir of 152,000 acre-ft. capacity to protect water users in the Colorado River Basin against depletion of their water supply by diversions through the continental divide tunnel.

TYPE SM TEST SWITCHES

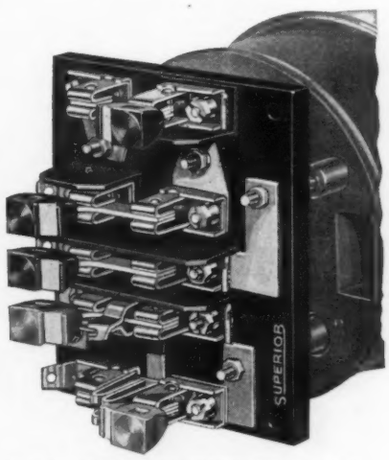
(Stud Mounting)

Type SM (stud mounting) Test Switches mount directly on the back connecting studs of the relays, meters and instruments they serve.



Cat. No. IA-111925 SUPERIOR Type SM Test Switch mounted on the studs of an IA relay.

Put Type SM Test Switches on your crowded switchboards. They'll give you the safe and sure test facilities you need.



Cat. No. COD-111211 SUPERIOR Type SM Test Switch mounted on the studs of a CO relay having duplex trip coils.

Bulletin 371 describes Type SM Test Switches. Write for it.

Superior Switchboard & Devices Company

CANTON, OHIO

*Been at It Since 1920

SUPERIOR

REG. U. S. PAT. OFF.

Good workmen demand good tools. In the hands of men who know—everywhere—the pliers are invariably Kleins. Only the keen, hand-honed, perfectly matched cutting knives of Klein Pliers—only the comfortable spring grip in the Klein handles—only the general all around quality that is an inherent part of every Klein Plier can satisfy men whose work demands the best in tools. This, perhaps, explains why Klein Pliers are the standard of quality by which others are judged—why the name Klein has stood for maximum quality, "since 1857."

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons
Established 1857 Chicago, Ill. U.S.A.
3200 BELMONT AVENUE

The Warner company, the lowest of the five bidders, is given 1,620 calendar days to complete the work under contract.

Other important construction features of the project include: A 13.1-mi. tunnel under the continental divide; Granby Reservoir to serve as a storage for water actually to be diverted to the eastern slope; Willow Creek Canal, through which water from Willow Creek, a Colorado River tributary, will be diverted into Granby Reservoir; Shadow Mountain Lake, formed by construction of the North Fork diversion dam downstream from the junction of the Grand Lake outlet with the Colorado River for the purpose of reducing the length of the tunnel; Granby pumping plant and feeder canal; Carter Lake, Horsetooth and Arkins Reservoirs, and other canals, diversion works, transmission lines and power plants.

In addition to the Green Mountain Power plant, ultimate development provides for five more plants to be installed as the power market becomes available. Power Plant No. 1, the only other one included in the initial development, will be located on the south bank of the Big Thompson River about ½-mi. below the Village of Estes Park.

Officials in charge of the project for the Bureau of Reclamation are Porter J. Preston, supervising engineer; Samuel F. Crecelius, construction engineer, and Cleves H. Howell and Mills E. Bunger, senior engineers.

●

Ideal Retail Rate for Bonneville Users Announced

An "objective" or "ideal" retail rate for municipalities, public utility districts and public bodies buying Bonneville power for distribution was announced Oct. 25 by J. D. Ross, Bonneville Administrator. Ross stated that this rate was neither a maximum nor a minimum, but rather a mark to shoot at. It would be subject to modification depending on particular conditions to be met in different districts.

The objective rate is as follows: First 50 kw.-hr. per month at 2½c per kw.-hr.; next 150 kw.-hr. at 2c; next 100 kw.-hr. at 1c; next 1,700 kw.-hr. at ½c; excess above 2,000 kw.-hr. per month at ¾c.

"At the start, most public agencies will have to charge more than the objective rate," Ross said, "and they freely will be allowed to do so. As districts and cities build their loads and eliminate wasteful competition and duplication of equipment, rates rapidly will drop to the objective level and below it."

The Bonneville Act gives the administrator the authority to regulate by contract the rates to be charged consumers. He explained that the re-sale rate of private utility companies, purchasing a portion of their power supply from Bonneville, presented a more complicated problem. This was to be worked out in collaboration with the state regulatory commissions having jurisdiction over the rates of the private companies. They should be able, however, to reduce their rates gradually until the "ideal" is reached, he said.

A public district's contract with Bonneville would follow a certain formula, Ross explained. After paying for Bonneville power, the fixed and operating costs of the district's system and any taxes that may be imposed, the district would build up a fund to cover one year's fixed charges on its system investment and a second fund for floods, storms, fire and other contingencies. It was also pointed out that the revenue bonds by which the districts are contemplating financing their operations cannot be sold without a guarantee that the rate charged would be sufficient to service these bonds as to interest and retirement. These variables in the formula will cause a wide difference in the rates charged in different districts, which may mean a variation of as much as 200% from the "ideal."

●

TACOMA CITIZENS, said to have the lowest electric rates in the U.S., will get still lower rates Jan. 1. Effective on that date, domestic customers of Tacoma Dept. of Public Utilities will pay 4½c per kw.-hr. for the first 20 kw.-hr.; 1c per kw.-hr. for the next 400 kw.-hr., and ½c per kw.-hr. for all additional hours. In announcing the schedule, Ira S. Davisson, Tacoma Utilities Commissioner, also said that the present complicated house-measurement method will be eliminated.

●

WILLAMETTE VALLEY, ORE., customers of Mountain States Power Co. will save in excess of $46,000 annually as the result of recent rate reductions. Savings under commercial lighting schedules will aggregate $40,000; under street-lighting schedules, $6,300. Top step in the commercial schedule has been cut from 6c to 5c per kw.-hr.

●

ESTABLISHED BY the Federal Power Commission in its Bureau of Finance & Accounts is a new Division of Original Cost, which will carry out the work prescribed by the Uniform System of Accounts. The division has already begun to examine accounts and records of utilities in Kentucky.

Washington Water Power Releases Historical Film

Shown last month in the Inland Empire, Wash., was a motion picture, with sound effects, telling the history of the development of electric power in that region. Prepared by Washington Water Power Co., the film was designed to acquaint the public with the details of the utility's operation and to build goodwill.

E. J. Crosby, publicity manager for the company, wrote the script and directed the picture. Narrator is R. B. Childs, assistant general manager of the company.

Childs tells his story as the rivers and glaciers of the Northwest, the early crude mills and the most modern of power plants, the dimly lighted pioneer cabins and the brilliant buildings of today each take their turn on the screen. Daring of the linemen and the romance of the line patrols and trouble shooters are also shown.

●

CITY OF SAN FRANCISCO'S petition for an extension of the injunction restraining the city from selling Hetch Hetchy power to Pacific Gas and Electric Co. was last month denied by Federal Judge Michael J. Roche. The injunction becomes effective Dec. 28. The court said that on Dec. 20 it would again hear arguments from the city on its plea for extension.

●

CORRECTION: The Nunn Memorial Museum established at Olmsted, Utah, by Utah Power & Light Co. was named for the late L. L. Nunn and his brother P. N. Nunn, who is now living in San Diego.

●

CONTRACT GRANTING exclusive right to furnish all power and light in the Madison Park area, Seattle, for 25 yr. has been awarded Seattle City Light by the Madison Park Corp. An underground distribution system installed in the area by O. A. Carlson, electrical contractor and co-promoter of the Madison project, will be purchased from him by the department.

●

CITY OF CRANBROOK, B. C., has applied to the provincial government for a loan to finance construction of a municipal hydroelectric plant on the St. Mary's River near Wycliffe, B. C. The city is now served by East Kootenay Power & Light Co.

●

FEDERAL POWER COMMISSION has begun publication of its 1938 series of rate reports showing, in the form of typical bills, the rates charged for electric energy in each incorporated community.

★Stamina and reliability—that is why you will find these Gardner transformers installed in the vault at the new Radiation Laboratory at University of California. Shown are a 300 kva., 3-phase, 2400/4160Y to 240/480 volts and a 50 kva., 3-phase, 2400/4160Y to 240/120 volts transformer. In a far corner (not shown) is a 200 kva., 3-phase, 15,000 volts to 240/280 volt Gardner transformer.

★ SERVING SCIENCE UNFAILINGLY . . *Efficiently*

FOR the most exacting performance, science as well as industry depends upon Gardner transformers. Built by experts, they have exceptionally long life of trouble-free, dependable operation. To obtain lower maintenance costs and improved transformer service consult our nearest representative today.

Gardner Electric Manufacturing Co.

4227 Hollis St. Emeryville, Calif.

REPRESENTATIVES

Geo. E. Honn Co., 420 Market St., San Francisco, Calif.; Beesen Engineering Co., 2501 E. 52nd St., Los Angeles, Calif.; Industrial Electric Co., 1304 Stewart St., Seattle, Wash.; Modern Electric Co., 37 Richards St., Salt Lake City, Utah; Kranefeld Engineering Co., 3416 14th Ave., Denver, Colo.

GEO. E. HONN CO.

420 MARKET STREET SAN FRANCISCO, CALIF.

Gives Quick Service on Quality Products from Local Stocks

MANUFACTURERS' REPRESENTATIVES FOR:

PYREX INSULATORS
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CAPACITORS
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CONNECTORS, GROUND ROD CLAMPS, UTILITY HOISTS
● Jasper Blackburn Products Corp.

GROUND LINE POLE TREATMENT
● Osmose Corp. of America

METERING INSTRUMENTS
● Landis & Gyr, Inc.

CROMPTON TONG TEST AMMETER
● Columbia Electric Mfg. Co.

UNDERGROUND TOOLS AND EQUIPMENT
● T. J. Cope, Incorporated

TREE TRIMMING EQUIPMENT
● Bartlett Manufacturing Co.

FRICTION AND RUBBER TAPES
● Clifton Manufacturing Co.

INITIAL HEARING to fix just compensation for the Pacific Gas and Electric Co. properties to be condemned within the Sacramento Municipal Utility District was to have been held in San Francisco, Nov. 29. This date was set after the California Railroad Commission ruled that it has jurisdiction to evaluate the utility's electric distribution facilities.

●

PIONEER WORK of San Joaquin Light & Power Corp. in the development of agricultural pumping has been recognized by the New York World's Fair. The company has been asked to prepare an exhibit demonstrating the growth of electrically pumped irrigation as a part of a general exhibit on rural electrification. The display, which is largely pictorial, is being set up under the direction of E. G. Stahl, sales manager.

●

Contracts Awarded

To MEACHAM & BABCOCK, Seattle, for wiring on new Bellingham, Wash., city hall, $13,725.

To BARRETT & HILP, San Francisco, for electrical work on California Coliseum Livestock Barn at the Golden Gate International Exposition, $12,674.

To GOLDEN STATE ELECTRIC CO., Los Angeles, for wiring on classroom at San Pedro (Calif.) High School, $5,517.

To NEWBERY ELECTRIC CORP., Los Angeles, for installing 167 electroliers on various streets of Visalia, Calif., $45,351.

To LEIBERT & TROBOCK, San Rafael, Calif., for constructing new units, altering present building and improving plumbing and electric systems at San Rafael High School, $126,-861.

To CALIFORNIA ELECTRICAL CONSTRUCTION CO., San Francisco, for constructing substation to serve the transportation system on the San Francisco-Oakland Bay Bridge.

To WAGNER ELECTRIC CORP., St. Louis, for power transformers for Green Mountain Substation, Colorado-Big Thompson project, $20,-092; to Westinghouse Electric & Mfg. Co. for instrument transformers, $9,824; to Royal Electric Mfg., Chicago, for disconnecting switches, $9,895.

To KERN & KIBBE, Portland, for alteration of existing fish ladders and construction of fish traps for migratory fish control at Rock Island Dam on the Columbia River. Work includes, besides alterations, construction of three traps and approaches to the traps. A portion of each existing ladder will be removed and traps constructed in its place.

To GRAYBAR ELECTRIC CO., Tacoma, Wash., for six 5,000-kw. transformers for Tacoma City Light's Nisqually Substation, $46,147.

To GEORGE SNIDER CONSTRUCTION CO., LTD., Vancouver, B. C., for building two-story electrical shop and meter building for B. C. Electric Railway Co. in Vancouver, $50,000.

To ROY M. BUTCHER, San Jose, Calif., for electrical work on five-story State Office Bldg., Sacramento, $83,371. To M. R. Carpenter, Sacramento, for heating and air conditioning, $133,146.

To HAVRE (MONT.) ELECTRIC SERVICE for wiring on high school building at Chinook, Mont., $5,330.

To COAST ELECTRIC CO., Los Angeles, for electrical work on auditorium and cafeteria at Delano (Calif.) High School, $17,545.

To NEPAGE-MCKENNY CO., Seattle, for electrical work on additions to Edmonds (Wash.) High School, $16,613.

To ALTA ELECTRIC & MECHANICAL CO., San Francisco, for electrical work on Federal Bldg., Golden Gate International Exposition, $114,392.

To CASCADE ELECTRIC CO., Great Falls, Mont., for electrical work on airport buildings at Great Falls, $24,765.

●

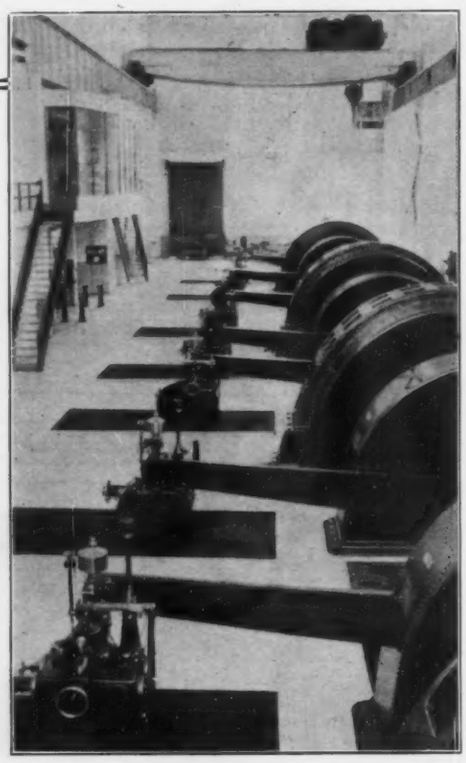
REA Activities

SUN RIVER ELECTRIFICATION ASSN., Fairfield, Mont., has awarded a contract to Cahill-Mooney Construction Co., Butte, Mont., for constructing 74 mi. of line in Teton and Cascade Counties. $59,192.

INLAND EMPIRE RURAL ELECTRIFICATION, INC., Spokane, has awarded a $78,461 contract to Fritz Ziebarth, Long Beach, Calif., for constructing 90 mi. of line in Spokane and Stevens Counties. The project has been allotted

Moccasin Plant Modernized

—after 12 Years of Continuous Operation



Replacement of buckets and needle points in the Moccasin Creek plant was not only a normal maintenance procedure but an opportunity for modernization which, through substantial increase in power output, will return the cost of replacements many times over. Utility engineers may take full advantage of the many improvements in hydraulic turbine design which have been realized in recent years. The older units can be modernized at small cost as worn parts are replaced. Consult with Pelton engineers.

The Pelton Water Wheel Company
HYDRAULIC ENGINEERS

120 Broadway NEW YORK
2919 Nineteenth St. SAN FRANCISCO
Paschall Station PHILADELPHIA

PELTON

$20,000 to finance house-wiring and plumbing installations.

RURAL HOMES ELECTRIC COOPERATIVE, Willows, Calif., has filed articles of incorporation. The project, brought to life when the California Railroad Commission refused permission to Pacific Gas and Electric Co. to build a line from Willows to Fruto and Elk Creek, would cover points in Colusa, Glenn and Tehama Counties. Principal place of business would be Elk Creek.

UMATILLA ELECTRIC COOPERATIVE ASSN., Hermiston, Ore., has been alloted $37,000 to build 33 mi. of line in Morrow and Umatilla Counties.

BIG HORN RURAL ELECTRIC CO., Basin, Wyo., has been allotted $207,000 to build 182 mi. of line to serve 502 customers in Big Horn and Washakie Counties.

GARLAND LIGHT & POWER CO., Powell, Wyo., has been allotted $22,300 to build 18 mi. of line in Park County.

RAVALLI COUNTY COOPERATIVE ELECTRIC ASSN., Corvallis, Mont., has been allotted $15,000 to build 10 mi. of line in the county.

BENTON RURAL ELECTRIC ASSN., Prosser, Wash., has awarded a contract to Electric Smith, Spokane, for building 48 mi. of line. $35,650.

ABOUT PEOPLE

Portland G. E. Names Hodge Director of Cooperation

Frederic G. Hodge has been appointed director of dealer cooperation for all the divisions and districts of Portland General Electric Co. except the City of Portland and territory handled directly from the Portland office. He also serves as assistant to George E. Sullivan, general division manager.

Hodge went to PEPCo in June 1938, when Sierra Pacific Power Co., for which he was sales manager, loaned him to PEPCo to effect changes in the company's merchandising policies.

A graduate of the University of California, Hodge took a graduate students' course at Westinghouse Electric & Mfg. Co., then joined Pacific Gas and Electric Co.'s sales organization. From there he went to Wesix Heater Co. as heating engineer; then, in 1932, to Sierra Pacific Power.

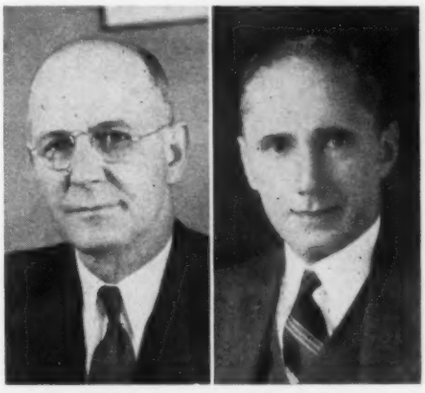
●

GEORGE LIBBEY, who for several years supervised advertising and sales promotion activities on heating devices for General Electric appliance and merchandising department, has been transferred to the sales department as commercial representative in the West. His headquarters will be in Ontario, Calif. He will continue to represent the heating-device section, covering such products as electric irons, toasters, sunlamps, roasters, etc.

Ehrlich Succeeds Balzari as President of McGraw-Hill

R. A. Balzari, president of McGraw-Hill Co. of California, resigned, effective Dec. 1, in order to devote more time to his work as sales and marketing counselor. Howard Ehrlich, executive vice-president of McGraw-Hill Publishing Co., has been elected to succeed him.

Retained as publishing counselor for both ELECTRICAL WEST and McGraw-Hill Publishing Co., Balzari will remain on the board of directors of the California subsidiary so that his sales and marketing experience will be available to the company and its advertisers.



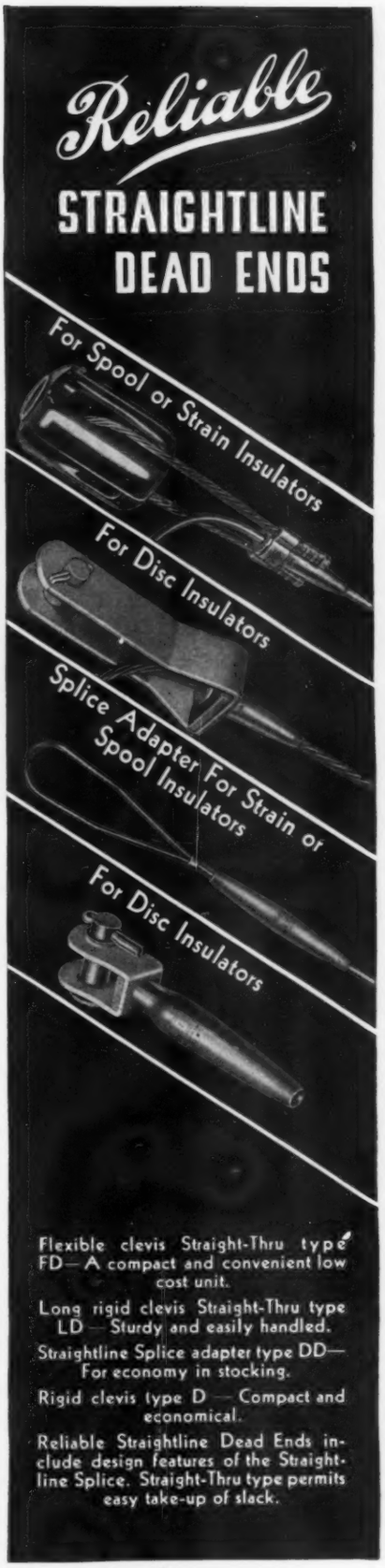
BALZARI EHRLICH

Balzari is an electrical engineering graduate of the University of California, class of 1908. Following a brief experience with the Pacific Gas and Electric Co., he joined the San Francisco district sales staff of Westinghouse Electric & Mfg. Co. He was district industrial manager when he resigned in 1925 to join the McGraw-Hill organization as marketing counselor in New York. He left McGraw-Hill early in 1934 to engage in sales and marketing counsel work on the Pacific Coast with the Sales Analysis Institute. Later in that same year he was retained on a part-time basis by McGraw-Hill to head up Pacific Coast operations. He has been president of the California company since 1936.

Ehrlich has had a broad experience in the publishing field in the electrical industry. He started the Electrical Trade Publishing Co., publishers of the *Jobbers' Salesman*, in Chicago, and later purchased *Electrical Contracting*. Shortly after these publications were purchased by McGraw-Hill he was placed in charge of all of the company's electrical magazines. He became executive vice-president of the company in April 1937.

●

BRIAN MADSEN has joined Huish Electric Co., Provo, Utah, appliance store, as radio repairman.


Reliable
STRAIGHTLINE
DEAD ENDS
For Spool or Strain Insulators
For Disc Insulators
Splice Adapter For Strain or Spool Insulators
For Disc Insulators
Flexible clevis Straight-Thru type FD—A compact and convenient low cost unit.
Long rigid clevis Straight-Thru type LD—Sturdy and easily handled.
Straightline Splice adapter type DD—For economy in stocking.
Rigid clevis type D—Compact and economical.
Reliable Straightline Dead Ends include design features of the Straightline Splice. Straight-Thru type permits easy take-up of slack.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE • CHICAGO ILLINOIS

BURNDY

SCRULUG

The one-piece lug that cannot fall apart. Low in cost, high in strength and quickly installed with pliers or screwdriver . . .

Type KPA

made in 4 sizes for 30 conductor sizes

APPROVED BY UNDERWRITERS

FREE a sample Scrulug on request; mention wire size

BURNDY Engineering Company, Inc. 459 E. 133 Street, N. Y. C.

CHROMALOX

Range buyers know these units provide faster cooking, and more of it. Utilities know they encourage electric cooking, and cut servicing costs. Everyone likes them.

Represented by

MONTGOMERY BROTHERS
911 Western Ave., Seattle, Wash.
1501 N. W. Kearny St., Portland, Ore.
61 Fremont St., San Francisco, Calif.
912 E. Third St., Los Angeles, Calif.

THE PETERSON COMPANY
1921 Blake St., Denver, Colo.

EDWIN L. WIEGAND CO.
7540 Thomas Blvd., Pittsburgh, Pa.

Childs Appointed Head of Washington W. P. Division

R. B. Childs, assistant general manager of Washington Water Power Co., has been placed in charge of the company's newly created Spokane division.

Members of the division staff are: A. J. Schulthess, general superintendent of Spokane United Railways; A. H. Beckwith, superintendent in charge of

R. B. CHILDS

substations, underground and overhead lines; Frank A. Tool, sales manager; J. E. Winton, credits and collections and customer service, and J. A. Riner, who will coordinate the work of the division and assist Childs.

The division includes the City of Spokane and Spokane Valley.

●

GEORGE C. MILLER, senior executive of Jarvis Electric & Refrigeration Co. and mayor of Vancouver, B. C., is campaigning for reelection. He is being supported by Fred Hume, head of Hume & Rumble, New Westminster and Vancouver electrical engineering firm and present mayor of New Westminster.

●

J. R. ROBERTS, of Redmond, Ore., has been named to Pacific Power & Light Co.'s board of directors. He represents the Deschutes district.

●

J. S. HOMERSHAM, chairman of the relations committee of the Vancouver (B.C.) Electrical Assn., has been appointed the electrical industry's representative on the council handling the Dominion-Provincial Youth Training Plan in Vancouver. This body helps to provide grounding in various careers for unemployed youths.

●

F. I. WOLTZ, formerly engaged in industrial engineering and sales work for Metropolitan Edison Co., Pa., has joined E. A. Wilcox Co., San Francisco firm specializing in heavy-duty heating equipment, as industrial sales engineer.

C. T. BACKEMAN, in charge of lighting sales for Puget Sound Power & Light Co., and G. W. Milliken, vice-president and general sales manager for Southern Colorado Power Co., are members of Edison Electric Institute's home-lighting equipment sales committee, which heads up the institute's soon-to-be-launched home-lighting program.

●

GEORGE I. MOMERY, district manager of West Coast Power Co.'s Burns, Ore., office, has been transferred to Fort Bragg, Calif., where he holds a similar position. H. Gray, district manager at Fort Bragg, takes over the Burns office.

●

HARRY L. GARVER, rural electrification investigator at Washington State College for the past thirteen years, has become a research worker on rural electrification with the Bureau of Agricultural Engineering, Washington, D.C.

●

O. A. PETRI, Northern Sound & Radio Co., Portland, has patented a series of lockers which fit into the ordinary domestic refrigerator. Refrigerators with these lockers are said to be especially useful in small apartments, cabins and camps where guests require only a small amount of refrigeration for a short time. Each guest rents one or more lockers as his needs require.

●

ROY M. BUTCHER, San Jose, Calif., electrical contractor, has been reelected chairman of the Contractors' State License Board. Stephen L. Ford, of Long Beach, is vice-chairman.

●

M. E. SHOTWELL, Idaho Power Co.'s service foreman at Twin Falls, has invented what is said to be a more accurate and efficient, yet inexpensive method of testing watthour meters. To be known as the Shotwell Reflecto Meter Tester, the apparatus is designed to count automatically the revolutions of the disc of a watthour meter merely by adjusting the apparatus to the meter.

●

Beck Becomes Full-Time Safety Director for Idaho Power

Eldon E. Beck, for the past nine years superintendent of Idaho Power Co.'s Swan Falls power plant, has been appointed the first full-time safety director of the company. He will work within the department of land, taxes and insurance under the direction of G. H. Petersen.

In announcing the appointment, President C. J. Strike said: "Our company desires to improve its safety record, and we feel it can best be accomplished by a safety organization directed by a full-time man."

James F. Hodges Dies; Succeeded by E. N. Husher

E. N. Husher, assistant superintendent of distribution for Southern California Edison Co., has been appointed superintendent to succeed James Foster Hodges, who died Oct. 27.

Mr. Hodges, 52, had been superintendent of distribution since 1934. He became identified with the electrical industry in Porterville, Calif., in 1905 when he joined Mt. Whitney Power Co., one of the Edison company's predecessors, as ground man. Later he was an operator at the Kaweah hydro plant, then at the Visalia steam plant. He was employed in the distribution service in the San Joaquin Valley territory until 1922, when he was made district superintendent at Long Beach. From 1925 until he became assistant superintendent of distribution in 1929, he was superintendent of the western division.

Husher was assistant superintendent of distribution during the past year. During the preceding six years he was superintendent of materials at Alhambra.

●

F. J. MAHR and Charles A. Carlson, both of Pacific Gas and Electric Co.'s San Francisco office, were first and second prize winners in the company's Electric Heat in Industry Contest for employees. G. E. Hersom, of Oakland, won third prize.

●

NORMAN TUSTIN was winner in B. C. Electric Railway Co.'s lamp-globe sales contest for employees. He sold lamps totalling $575 in value.

●

L. MACDONALD and E. G. Beastal, both of MacDonald Electric, Ltd., Victoria, B. C., appliance store, won first and fifth prizes respectively in Canadian General Electric's washing-machine sales contest.

●

CLAIRE H. WEBSTER, employee in Washington Water Power Co.'s light and power division, Spokane, has been awarded the Edison Electric Institute medal for saving the life of a fellow workman, Earl L. Morse.

●

OLIN RIRIE, formerly industrial salesman in Utah Power & Light Co.'s Ogden division, has joined the personnel department to assist with customer survey work and employee education.

●

STUART SMITH, credit manager of Northern Electric Co., Ltd., Vancouver, B.C., is a member of the executive committee of the British Columbia Committee of the National Housing Act & Home Improvement Plan. T. C. Clarke, district manager of the same company, is chairman of the finance committee.

GEORGE C. THOMAS JR., vice-president and treasurer of Thomas & Betts Co., Elizabeth, N. J., has been awarded the James H. McGraw Manufacturers' Medal for 1938 in recognition of his contribution to the manufacturing branch of the electrical industry.

J. T. DEPPE, Central Arizona Light & Power Co., has been named chairman of the new Salt River Valley (Ariz.) Adequate Wiring Bureau. Bureau directors include Martin Noack, W. A. James, Frank Waite, Sid Cooper, Max Kraft and William Schardt.

STEEL STRAND ◆ TELEPHONE WIRE

Crapo GALVANIZED PRODUCTS

SPECIFIED BECAUSE OF PROVED PERFORMANCE

Crapo Galvanized Steel Strand has earned its enviable reputation for long, dependable, economical life by outstanding performances in actual service. That's why it so often is specified by leading utilities for the more important construction jobs. The heavy, uniform, pure zinc coating—applied by the *Crapo* Process—is notable for its adhesion and ductility; its ability to withstand bending and twisting; its lasting resistance to corrosion. Both the finished strand, and the wire from which it is made, conform in every detail to the most rigid specifications for tensile strength, elongation, size, galvanizing and ductility.

Crapo Galvanized Strand is readily available in all standard grades and sizes. Ask your Jobber, or write direct for technical details!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

3 Adequate Stocks

Electrical Specialty Co., Inc., 316 Eleventh St., San Francisco.

Electrical Specialty Co. of Southern California, 449-451 South San Pedro St., Los Angeles.

Electrical Specialty Company, 714 Fourth Ave., Seattle.

● Two more stocks just added. This makes three stocks of NICHROME* and other D-H electrical alloys serving Pacific Coast users. No waiting for shipments. No long-distance correspondence.

*Reg. U. S. Pat. Off.

DRIVER-HARRIS COMPANY
Harrison, N. J.

NICHROME

THERE ARE "BESTS" IN EVERY INDUSTRY

IN ELECTRICAL APPLIANCES IT'S

Sunbeam

Automatic MIXMASTER
Double Automatic IRONMASTER
SILENT AUTOMATIC TOASTER
Automatic COFFEEMASTER
SHAVEMASTER
FLAT TOASTER • FAN HEATER
GLASS COFFEE MAKERS
WET-PROOF HEATING PAD
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CHICAGO FLEXIBLE SHAFT COMPANY
5600 West Roosevelt Road, Chicago, Ill.
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49 YEARS MAKING QUALITY PRODUCTS

Who needs an AGENCY ACCOUNT?

Our Agency Service has sound value for everyone who has difficulty keeping a security portfolio in good order, and who appreciates the real economy of a practical convenience. Let us send you a descriptive booklet, *An Introduction to Agency Service.*

Just ask for booklet M-3.

CROCKER FIRST NATIONAL BANK
OF SAN FRANCISCO
California's Oldest National Bank

F. L. HOCKENSMITH, manager of the Electrical Development League of Southern California, attended the International Assn. of Electrical Leagues' conference at Philadelphia, Nov. 14-17.

●

GEORGE A. MULKEY, business manager of Electrical Workers' Union No. 77 and a prominent member of the Electric Club of Washington, has been named a member of Seattle's three-man civil service commission.

●

JACK CARMICHAEL, chairman of the social committee of the Vancouver (B.C.) Electrical Assn., is in charge of arrangements for an association dance to be held in Vancouver Jan. 20.

●

AL ESCOFFIER, for the past several years in the service department of Van Dorn Electric Tool Co., Seattle, has been appointed northern California sales representative. He will maintain headquarters in San Francisco and Oakland.

●

GEORGE MILTON SAVAGE, 73, the man who was largely responsible for the development of Tacoma's municipal hydroelectric system, died in Tacoma Nov. 11. Mr. Savage came to Tacoma in 1884 and rose from a common laborer for Northern Pacific Railway Co. to a successful contractor. In 1910, when the Tacoma city council adopted his plan for a hydroelectric system, he was awarded the contract for construction of the power plant at Nisqually.

●

Speakers

F. T. Letchfield, consulting engineer for Wells Fargo Bank & Union Trust Co., San Francisco, at a joint meeting of the Electric Club of Oakland and the East Bay Engineers' Club.

Before the Southern California Section, Illuminating Engineering Society —Lloyd A. Gates, Los Angeles Bureau of Power & Light: "Highlights of the 1938 National Convention," and Thomas A. Clarke, district engineer, Libby-Owens-Ford Co.: "Modern Store Fronts."

Thomas Wilfred, artist producer of "Lumia," a new art form employing light as the medium—before the San Francisco-Bay Cities Section, Illuminating Engineering Society.

Ben Sweetland, radio personality handling the KNX broadcasts for Los Angeles electrical dealers and the Bureau of Power & Light—before the Electric Cookery Council of Los Angeles. Arthur Sanford outlined the fall water heating campaign of the bureau.

At a joint meeting of the Air Conditioning Society and the Golden Gate Chapter, American Society of Heating & Ventilating Engineers, at Berkeley, Calif.—F. J. Kurth, vice-president and technical director of Anemostat Corp. of America; C. L. Peterson, and Neil H. Peterson. Kurth predicted that widespread acceptance of air conditioning must await the control of noise in air ducts in order to permit air streams to be delivered to interiors at high velocities and pressures through small pipes and thus diffused and mixed with room air.

Carl Johnson, president, Sterling Electric Motors, Inc., and H. D. Easterbrook, Westinghouse—at the Nov. 15 meeting of the Electrical Maintenance Engineers' Assn. of Southern California.

TRADE NOTES

Apex Closes Oakland Plant; G. B. Schuyler Promoted

Oakland factory of Apex Rotarex Corp. will be permanently closed the first of the year, G. B. Schuyler, Pacific Coast general manager and newly appointed executive vice-president of the company, announced last month. Henceforth, all washing machine production will be carried on in the company's expanded Cleveland plants.

G. B. SCHUYLER

Distribution facilities in the eleven Western states will not be affected by the move. A general office, factory service agency and display room will be retained in Oakland. Salesrooms and warehouses in Los Angeles, Seattle, Salt Lake City and Denver will continue to serve dealers in their respective territories.

Schuyler's appointment as executive vice-president crowns a career which started at the University of California. Entering business as a gasoline salesman, he soon joined the old Johnson Washer Co., of Oakland, pioneer washing machine factory on the Pacific Coast. In 1929, when the Johnson com-

pany was purchased by Apex Electric Mfg. Co., Schuyler was appointed general manager and vice-president for the eleven Western states. He was later advanced to the presidency of the Oakland factory.

According to present plans, Schuyler will leave for Cleveland when the appointment goes into effect next month. His duties there will call upon him to correlate the sales, production and promotion of Apex products.

Schuyler explained the closing of the Oakland plant as "due to the cost of duplicating the new machinery" now being installed at Cleveland. The Oakland plant was recently shut down for six weeks by a strike.

●

BRYSON & SONS, New Westminster, B.C., hardware store, has opened a major home appliance department. Lloyd Barber and Ralph Wilson are in charge.

●

OWENS-CORNING FIBERGLAS CORP. is a new company formed by Owens-Illinois Glass Co. and Corning Glass Works for the production of a variety of articles made from fibre glass. Announcement of the formation of the company carried the forecast that as a result of the new products vacuum cleaners would be made lighter and smaller, stoves and refrigerators would be glass insulated, etc.

●

H. J. LANGDON, Victoria, B.C., electrical contractor, has completed the lighting and wiring installation in the Dominion Bank's new building in that city.

●

BEVERLY LIGHTING CO. is a new residential lighting concern opened in Los Angeles by E. W. Thompson and C. E. Meriweather.

●

INSTALLATION of special lighting equipment in the new sports building at New Westminster, B.C., has been completed by Robson Electric of that city. Lights over the playing floor comprise 31 silver-bowl lamps, of 300 and 500 watts, providing semi-direct lighting. Sixteen special deep-set angle reflector lamps illuminate the badminton court. Canopy lights cast a column effect on the exterior of the building.

●

POLAROID CORP. has announced that its first lighting unit, a desk lamp, will be sold direct by the company to selected jobbing and retail outlets. Heretofore the lamp has been sold by four licensed manufacturers of portable lighting equipment.

●

H. R. CURTISS CO., northern California distributor of Packard-Bell radios, has opened a new showroom in the Western Merchandise Mart, San Francisco.

HUME & RUMBLE, LTD., Vancouver, B.C., has been awarded the electrical sub-contract on the new Canadian National Railway station being built at Saskatoon, Sask. This is the first time the company has been successful in invading the prairie provinces. Further developments may be expected, since an office has recently been opened in Edmonton, Alta.

●

GAMBLE STORE, recently opened in Shelley, Utah, is specializing in ranges, refrigerators and small appliances. Sam McGratney is manager.

●

NELSON ELECTRIC CO. is remodeling its building in Nelson, B.C.

●

G. N. BISHOP has registered his declaration of partnership in the business of Marine Electric, Vancouver, B. C.

●

JAMES M. THORBURN, Los Angeles, and R. F. Hamilton, Denver, have been appointed representatives for Litecontrol Corp., Boston.

●

ROUBLE ELECTRIC SUPPLY CO., INC., has been started in Seattle by Lester S. Rouble, formerly connected with North Coast Electric Co. and Northwest representative for Conlon washer.

●

WALBURN NEON, LTD., Vancouver, B. C., has completed installation of a complete neon and fluorescent lighting system in a theater in that city. It is the first time that neon lighting has been used on the interior of a Vancouver theater.

●

J. M. EDGAR ELECTRIC and Okanaga Electric, Ltd., both of Vernon, B. C., installed electrical equipment in the new Capitol Theater in that city.

●

WATER HEATER ENGINEERS, INC., is a new Portland firm which will specialize in domestic water heaters and auxiliary air heaters. Organizers are A. Flynn, Dan Lengasher, John McMahon and M. Caruthers.

●

HARRY E. SHEIDLER has opened an appliance and radio store in the University District of Seattle. Stewart-Warner radios and refrigerators and Haag washers and ironers are featured.

●

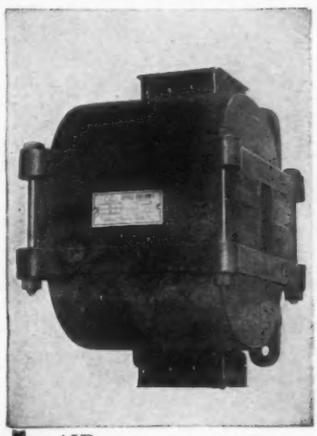
BUSINESS OF Hy-Grade Radio Supplies, Ltd., has been taken over by Hy-Grade Radio, Ltd., Vancouver, B.C. The firm specializes in the wholesale field.

●

Moved

NIXON'S, LTD., Victoria, B. C., radio and appliance store, from 833 Yates St. to 1205 Douglas St.

YOU SAVE



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AIR COOLED TRANSFORMERS

● With a Jeffries Air Cooled Transformer money can be saved. The Air Cooled construction lengthens the life of the transformer and lowers repair costs. Plant expansion and extension can be made economically for a Jeffries Transformer provides the voltage change at the point desired without the need of long and expensive conduit runs. Besides a complete line of standard transformers, special designs and voltage furnished to order. Type S. S. Transformer 1 to 5 K.V.A. illustrated.

JEFFRIES TRANSFORMER COMPANY
5706 LONG BEACH AVE., LOS ANGELES

WANTED

EXPERIENCED MANUFACTURER'S AGENTS

This is one of those really *rare* opportunities. The line consists of Safety Switches, Meter and Entrance Switches, Meter Troughs, Fuse Panels, Testing Devices. A big business, firmly rooted in the national fabric—reputation is flawless. Even competitors regard this as the "top" line in its field. Big profits await the agent who can sell!

The man or organization we seek must have a strong following among electrical jobbers and utilities. Be frank in your reply. We promise to be equally frank. Our organization knows about this advertisement.

Write to P.O. Box 446
Church Street Annex
NEW YORK, N. Y.

RADIO DOCTORS HOME APPLIANCE CO., Portland appliance store, to 1027 Southwest Broadway.

MODESTO ELECTRIC CO. from 193½ I St. to 1308 J St., Modesto, Calif.

MOORE ELECTRIC SUPPLY CO. from 550 Fifth St., San Francisco, to 1625 Van Ness Ave.

M. L. FOWLER, district representative, Benjamin Electric Mfg. Co., to 316 Commercial St., Los Angeles.

WANTED

SALES REPRESENTATIVES

Exclusive Territories Open

CONNECTICUT TELEPHONE AND ELECTRIC SIGNALING DIVISION of Air Devices Corp., Meriden, Conn., is prepared to grant exclusive territories now open to engineering and sales organizations equipped to sell Connecticut Signaling and Telephone Systems for hospitals, apartment houses, hotels, offices, factories, etc. Large line—many exclusive features — new developments; modern engineering and manufacturing facilities; new and practical demonstration equipment; liberal policy.

Write for further details and appointment.

J. A. SULLIVAN, Sales Mgr.

ELECTRICAL TESTING LABORATORIES

Electrical Photometrical, Chemical and Mechanical Tests. Inspection of Materials and Apparatus at Manufactory.

80th St. and East End Ave., New York

CLASSIFIED SECTION

● COST of undisplayed classified ads is 5 cents a word, minimum $1.00 insertion. Box numbers in care of our San Francisco office count as 10 words additional in undisplayed ads. ● RATES per column inch of displayed ads is $3.75. ● All classified ads are payable in advance.

MANUFACTURERS ATTENTION! A selling organization devoted to selling RURAL LINE projects throughout the country is interested in securing agency rights or distributorship for material that is needed by this new field. Nearly $15,000,000 will be spent in 1939. How much of this business will be your share? Write full details and descriptive matter of your products to THE RURALINE COMPANY, 827—14th St., N. W., Washington, D. C.

LETTERS

"Bright Skies"

DEAR SIRS:

I was certainly glad to read your editorial, "Bright Skies," in the ELECTRICAL WEST.

During recent months our merchandise salesmen have gradually been slipping into a blue attitude towards the possibility of selling merchandise. This has been primarily due to two things: First, some of the boys think that since the Portland General Electric Co. went out of the merchandising business after adopting the EH & FA we might do the same. While this is not our intention, it is sometimes hard to stop such rumors. The other factor affecting the boys' attitude has been our fight with public utility districts in the past election. As a result of this attitude we are at present trying to re-instill optimism regarding the market and enthusiasm on the part of our men towards merchandising.

This week (Nov. 14) we are opening our last campaign for the year, which will run for the coming 6 weeks. It is based on a Hotpoint campaign called "False Face," in which the men are supposed to rip away the false face of hard times and sell a lot of merchandise.

Your editorial is most timely and we plan to mimeograph it and send it out to all our sales people. I felt that you might be interested in our use of it.

Patrick Johnson
General Sales Manager
Puget Sound Power & Light

New and Old

DEAR SIRS:

The well worn phrase, "Great minds run in the same channels," has again been proved. Jim Barrett and I were working an article centering around the recently completed Red Seal home of Mr. D. Stephenson, 523 West Yosemite Avenue, Madera, Calif., when we received a letter from Vic Hartley suggesting that such an article would be of interest to ELECTRICAL WEST, more so in view of the fact that in 1926 Mr. Stephenson's former home received the first Red Seal Certificate to be issued in Madera.

Enclosed is a letter from Mr. Stephenson, expressing his satisfaction with the installation. The houses have the same number of rooms except for an additional bathroom and a rumpus room in the new one.

It is interesting to compare the two installations. In the old house the connected load in lights was 1,400 watts; in the new one, 4,700 watts.

Installed in the old home in 1926 were an 8.9-kw. range, 5-kw. water heater, 3-kw. air heater, toaster, iron, percolator, 14 convenience outlets.

In the new one: an 11-kw. range, toaster, iron, percolator, 80 convenience outlets, waffle iron, refrigerator, 3 exhaust fans, 1 portable fan, ⅓-h.p. air washer, ½-kw. air heater, washing machine, mangle, vacuum cleaner, everhot cooker, elevator, 1 h.p., yard light, 3 radios, 4 clocks, house number, Xmas tree lights, photo enlarger, auto. gas furnace, auto. gas water heater.

C. H. Edman
San Joaquin Light & Power Corp.
Fresno

DEAR MR. BARRETT:

It was with a great deal of pleasure that I received the Red Seal certificate for my recently completed home. We first became acquainted with Red Seal in 1926, when our old residence was awarded the first Red Seal certificate issued in Madera; and it was our enjoyment of the electrical conveniences provided in it which prompted us to also wire our new home according to Red Seal specifications.

One would naturally assume, with the increase in the number of appliances that electrical costs would be proportionately higher. However, I find the reverse to be true, due not only to rate reductions, but to the improved and more efficient appliances now available as well. The new range far surpasses the old one in speed, and I am convinced that there is no exaggeration in your slogan, "Electric cooking costs only one-half of what you think it does."

In my business I have considered myself fairly familiar with building standards but a real appreciation of the value of complete wiring came only after occupying the new home. Both Mrs. Stephenson and myself now know the convenience resulting from the proper location of outlets and switches and particularly the step-saving features of three- and four-way controls.

I cannot speak too highly of the engineering service provided by the San Joaquin Light & Power Corp. in planning the wiring layout. The advisory service sponsored by the power companies and the electrical bureau is of great value to the home owner as well as to the contractor and electrical dealer.

Mr. & Mrs. D. Stephenson

Electra's Husband

FRIEND "HUSBAND":

Fan Mail! Ye Gods!

But the impulse was irresistible!

For a long time while I have been able to count upon one bright day in the long succession of drab ones, this coming upon the arrival of ELECTRICAL WEST and your page.

Oh yes, I read the other pages too, but later.

And for this same "long while" above indicated I have been sure that "Electra's Husband" must be a regular member, a skeet shooter, a dog lover, troubled with the itching heel or a *fisherman*.

At long last it has come out, in print, finally, to wit: Page 21, Vol. 81, No. 3, 2nd column, paragraphs four and five, and six.

FISHERMAN!

So cheerio fisherman, and here's a healthy damn or two from 'way back east in support of your well rounded phrases concerning CCC and the denuding of creeks, ponds, rivers and lakes of the finny tribe.

There's a swell philosophy in the fisherman who is also a salesman, as you well know. Why don't you write the parallel someday?

And so—best regards!

Ralph H. Jones
Secretary
Electrical League of Cleveland

PRODUCT DATA

1201:

S. MORGAN SMITH CO.'s new publication extolling the virtues of the Smith-Kaplan turbine is another in a comparatively short line of interesting trade booklets put out by the company. This 56-page booklet is worth having for the illustrations alone. Text is long but unbroken by dull notes. Described and illustrated are the advantages of the turbine (which has three important characteristics: a vane-free transition space, wing-shaped runner blades and adjustable runner blades), construction, operating results, typical settings, installations (including four pages on Bonneville) and shop views showing construction. Write ELECTRICAL WEST for No. 1201.

1202:
RELEASED BY Allis-Chalmers is a bulletin entitled "Type J Rocking Contact Rheostatic Generator Voltage Regulator." Shorter than its title, the bulletin includes a number of operating diagrams and detail views of the apparatus, and it points out the many advantages of this regulator. The regulator itself is especially suited for use with a.c. generators, synchronous condensers, generator line charging and protection against excessive over voltage on hydroelectric units due to sudden loss. Ask for 1202.

1203:
PROCEDURES FOR producing all kinds of welds in mild steel, for welding all metals used to any extent industrially and for applying surfacing metal to meet any type of wear-action in service are given in Lincoln Electric Co.'s bulletin 401-A. The procedures include: recommended current ranges and arc voltages; suggestions regarding arc length, polarity of welding current, distance to hold electrode from work, cleaning beads, welding up or down, use of wide and narrow beads, peening to increase hardness, quenching, weaving the electrode, etc. Properties of welds produced in various metals are also given. And, of course, there is some advertising of Lincoln products. If you're interested, Bulletin 1203 will bring you the facts.

Free to you . . . Any of these instructive bulletins simply by addressing a post card to ELECTRICAL WEST and asking for the desired bulletin by number.

1204:
"A NEW, USEFUL TREATISE on an old subject" is the way Elgin Softener Corp. explains its bulletin describing continuous blowdown systems for steam boiler plants. "The need of such systems," says the company, "is illustrated by typical plant studies with useful charts and tables." The latter also point out savings to be realized with heat exchangers. The booklet is plain but it might be of help to you—so write for No. 1204.

1205:
A CATALOG PURE and simple is W. N. Matthews Corp.'s bulletin covering housed and open-type fuse switches, disconnecting switches, reclosing fuse switches, universal fuse links, etc., for primary and secondary power distribution systems. It's not a perfectly dead, completely statistical catalog, however, so it is quite pleasant to peruse. Write for 1205.

1206:
ALSO A CATALOG, but of a different kind, is a new publication by Square D Co. Listed are safety switches, meter switches, fuse cabinets and panelettes, circuit breakers, panelboards, motor control, etc. There are figures and prices by the score. Which makes this of help to you if you're out to buy. No. 1206 will bring you the information.

1207:
OIL CIRCUIT BREAKERS form the subject for Pacific Electric Mfg. Corp.'s latest pamphlet; and, true to form, the company goes about the job of describing the breakers in the shortest, most painless manner possible. Listed where you can't miss them are three advantages of these units: fast opening and reclosing because of motor control; reliable because of sound design and quality construction; easy to install because they're shipped as units. Illustrations and more text expand the story. If you want No. 1207, ELECTRICAL WEST will get it for you in short order.

1208:
IT'S NO JOB at all to get information on induction feeder-voltage regulators. Westinghouse has published a raft of pamphlets and catalogs describing its products. Three in particular will give you a lot of information. The first, entitled "Voltage Regulation from the Generator to the End of the Line," is rather general in its descriptions and covers a variety of models. The second, "Westinghouse Induction Feeder Voltage Regulators," is not very specific but gives you a fair idea of the company's Type SU regulator. The third, "Induction Feeder Voltage Regulators —Type SU," is a 12-page loose-leaf folder insert which gets right down to brass tacks. In ordering Bulletin 1208, specify which pamphlet you want.

1209:
YET ANOTHER CATALOG is Automatic Switch Co.'s offering on solenoid valves for automatic and remote control of air, gas, steam and liquids. There are price lists and descriptive pages galore. Very likely, if you have any problems along this line, you could use the information. Write for 1209.

1210:
MOTORS are described in two General Electric pamphlets. The biggest, most complete pamphlet (GEA-1437C) contains information on integral and fractional-horsepower gearmotors for low speed operation. Construction features, advantages and uses, selection and application and types and ratings are covered. The other pamphlet (GEA-2026A) is only four pages, but it gives a thorough description of a brake motor rated to 50 lb.-ft. torque. In writing ELECTRICAL WEST for Bulletin 1210, be explicit as to which pamphlet—1437C or 2026A—you want.

1211:
"LAMPS BY LIGHTOLIER" is that company's effort to get a prospective buyer interested in its products. The catalog is a picture-book from cover to cover. Thus you can find at a glance what are the latest styles in lamp design—either for your own benefit or for your customers'. Write ELECTRICAL WEST for No. 1211.

NEW PRODUCTS

Card-Table Lamps

For those who enjoy card games, Lumidor Mfg. Co. is marketing a pair of semi-indirect card-table lamps. The lamps are easily attached to opposite corners of the standard-type tables. The bases are fitted with two removable chromium trays which hold high-ball glasses and an ash tray. Each lamp is made of cast aluminum with light-weight metal shades. They are sold in pairs.

Fluorescent Lamp

A fluorescent lamp which may be screwed into the ordinary socket and will effect an 80% saving in current costs has been placed on the market by Duro-Test Corp. Light output of the lamp is approximately 40 lumens per watt as compared with the 8 lumens per watt of filament lamps. Patents on the lamp cover a starter device which brings the lamp to maximum brilliance in a fraction of a second. No transformer is required. Tubes can be made both straight and in a variety of curved forms.

Window Reflector

Developed especially for more efficient illumination of low, medium or deep show-windows where merchandise is trimmed high was the new No. 704 reflector now being sold

by Sterling Reflector Co. The reflector combines the efficient "light-flo" stipple and silvered-glass construction. The perfectly round, 7-in. diameter bottom opening facilitates flush mounting. The unit uses standard 100-watt, A-23 lamps. It is furnished complete with holder.

Outlets

Electrical outlets where they are wanted, when they are wanted can now be had through use of Bull Dog Electric Products Co.'s 5-ft. set of "Universal Trol-E-Duct." Quickly installed, the set will provide a ready source of light and power over individual machines, over ironing tables, in small stores, etc. The set, which can be readily removed and installed elsewhere by the owner, includes a 5-ft. duct section inclosing two busbar conductors, supporting hangers, a 5-ft. cord with attachment plug and a movable trolley collector or semi-fixed plug for insertion in the duct.

"Sign-Former"

The "Sign-Former," a transformer representing a new type of design and presenting features important to users and makers of point-of-sale neon signs, has been announced by Sola Electric Co. The transformer incorporates in one unit both a cylindrical transformer core and a framework of metal tubing for the support of the neon tubes. Complete sign assembly can be made before shipment, thus permitting the user to install it simply by plugging into an outlet. The unit is compact enough to be hung between venetian blinds and the window glass.

Foot-Candle Meter

A new foot-candle meter, the "Photomet," released by G-M Laboratories, Inc., is said to offer the illumination engineer, photographer and laboratory technician a wide variety of sensitivities and ranges. It is adapted to all types of illumination measurement. Compactly built, the Photomet employs a high-powered photocell attached to a special micro-ammeter by a flexible 8-ft. cable. No batteries are required. The scale is divided into 50 divisions and is numbered with four different ranges. The unit needs no special leveling and has a knife-edge pointer to allow close reading. Five models are available.

Coffee Makers

New line of coffee makers has been announced by Landers, Frary & Clark. All models feature the glass filter rod, which allows coffee to come in contact only with

glass, eliminates the fabric and metal of many filters and insures a fast filtering process. Home models range in price from $4.95 to $6.95. Also available are two- and four-unit sets, a set complete with creamer, sugar bowl and tray and a model with tray.

Oil-Circuit Breaker

Latest Roller-Smith oil circuit breaker is a submersible manhole breaker for use in underground distribution systems. Automatic features may consist of one, two or three trip coils and bushing-type current transformers. Shunt trip coil, auxiliary switches and other attachments are available on special orders. Interrupting capacity is 50,000 kva. The breaker is rated at 200, 400 and 600 amp., 7,500 volts. It may be used outdoors.

Panel-Type Regulator

Panel-type voltage regulator has been designed by Acme Electric & Mfg. Co. to fit as an integral part of the modern electrical testing apparatus. More compact than older models, the unit is said to permit stepless adjustment of a.c. voltage from 0 to 135 volts. Non-burning, non-fusing, self-lubricating rheostat contacts tap each individual turn of the winding and thus make possible a more accurate control of the output voltage.

Fuse Link

To its line of fuse links for distribution cutouts, Schweitzer & Conrad has added links to improve the performance of plug-type cutouts. These links provide for two gaps in series following the blowing of the fuse, with the result that the dielectric strength of the cutout assembly is increased. Greater resistance to corrosion is gained by tinning the copper terminals. The short-circuit interrupting capacity of the cutout is increased. The links are available in capacities of 3, 5, 10, 15 and 25 amp.

"Black Light" Lamp

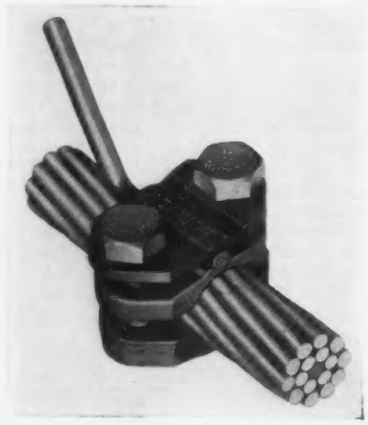
In answer to an increasing demand for a handy way of activating fluorescent paint by means of ultra-violet light, Keese Engineering Co., California agent for General Electric Vapor Lamp Co., has designed a portable, high-powered lighting unit using the new 100-watt, high-intensity, mercury-vapor lamp with an outer envelope of heat-resisting red-purple filter glass. The unit comes with a transformer and can be had with a floor stand instead of the handle with which it is ordinarily equipped.

Strain Clamp

To accommodate the middle range of conductor sizes—those ranging from 3/16 to 7/16 in. in diameter—Ohio Brass Co. has brought out an intermediate universal strain clamp. Having a reversible keeper piece, the clamp will take any standard conductors from 8A to 2A Copperweld, from No. 4 to 3/0 solid copper, from No. 5 to 2/0 stranded copper and from No. 6 to No. 2 A.C.S.R. It is particularly adapted for use with high-strength No. 2 and No. 4 A.C.S.R. having one steel and seven aluminum strands. Rated ultimate strength of the clamp is 10,000 lb.

Connector

Widespread use of A.C.S.R. and galvanized conductors, particularly in rural electrification, has indicated the need of a connector especially adapted for taking copper and galvanized taps from A.C.S.R. over the armor rods. An armor rod clamp introduced by Burndy Engineering Co. is said to answer this requirement. The connector consists of three clamping elements held in place by two bolts



and so arranged that the five parts constitute virtually a single piece. Thus, under no conditions, can individual parts be dropped and lost during installation or in transit. Design of the clamp permits the aluminum armor rods to bear against a galvanized surface, and the copper taps to bear against a copper surface. A constant spring pressure is maintained between conductors.

Pilot-Wire Relaying

Pilot-wire relaying equipment designed to overcome the objections of multiple-wire circuits, batteries and several relays has been announced by Westinghouse. The equipment uses only two pilot wires, no batteries, and has a single moving element at each end of the section of line. Complete high-speed, one-cycle protection for phase and ground faults is obtained by use of the device. It can be applied generally to existing currents without regard to the quality of or burdens on the current transformers being used. It is said that the relay will detect faults and close the breaker-trip circuits in the protected section in one cycle. A polarized relay element is used to reduce the moving parts and current-transformer-energy requirements to a minimum.

Explosion-Proof Motors

New line of explosion-proof ball-bearing motors has been announced by Fairbanks, Morse & Co. Approved by Underwriters' Laboratories for Class I, Group D hazardous locations, the motors are said to insure against accidental ignition or explosion of vapors or gases prevalent in plants producing gasoline, acetone, etc. The motors can be applied to pumps, blowers, production machines, etc., as easily as any standard open motor. Double-end ventilation is said to make for positive cooling from both ends of the motor and to eliminate "hot spots," thus adding to the life of the motor windings.

Antenna System

An answer to the problem of providing good radio reception in apartment houses and other multi-unit dwellings and at the same time eliminating the jungles of wires which are a frequent eyesore in large cities is offered by General Electric in the form of a new all-wave multi-coupler antenna system. The system can serve as many as 20 radios simultaneously. Its simplicity and ease of installation make it an inexpensive refinement for a multi-unit building. Reception is said to be improved since the system acts as an efficient noise eliminator because of the transformer in the antenna and the multi-coupler coil in each separate radio outlet.

Gadget Bin

A neat, compact, efficient and low-cost way of keeping track of screws, bolts, studs, washers, clips, fuses and other small parts required in the production and servicing of electrical equipment is provided by "Add-A-Bin," introduced by Noggle Products Co. This is a system of unit bins sold separately and assembled by the user to fit his individual needs. The bin housing may be screwed to a wall or a panel fashioned into a portable kit. Bins are so balanced that when the mechanic removes his hand they will automatically close. They may also be locked open or removed completely. Units are made in two series.

Pike Pole

Latest safety innovation in A. B. Chance Co.'s pike poles is a removable point. Made in a separate piece, flat on one end and with a spiral point on the other, the point is held in place by a spring catch. Principal advantage of the pole is the fact that for carrying the point may be inserted in the ferrule end of the pole point first. There is no need of buying a complete new pike pole when the point becomes badly worn; simply buy a new point.

Explosion-Proof Enclosures

Ward Leonard Electric Co. has announced a line of explosion-proof enclosures for pressed-steel rheostats. The enclosures meet the requirements of Class 1, Group D hazardous locations. All units are of cast iron. A pad tapped for ½-in. pipe for the entrance of wires is provided on the bottom of the case. The enclosures accommodate 8-, 13- and 15½-in. diameter pressed-steel rheostats and are regularly furnished for front of board mounting, but can be arranged for use with manual-drive accessories.

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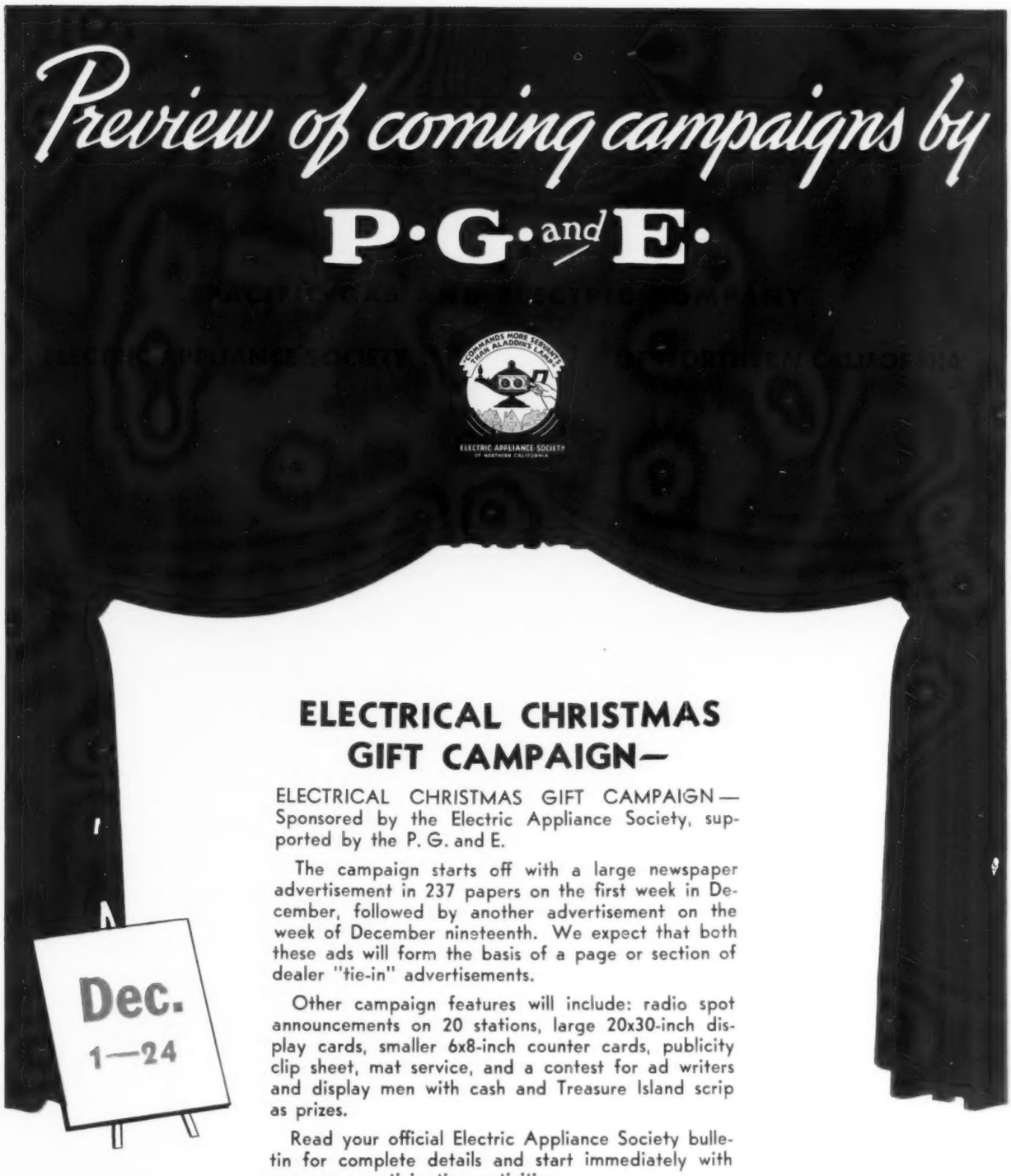
Preview of coming campaigns by

P·G·and E·



ELECTRICAL CHRISTMAS GIFT CAMPAIGN—

ELECTRICAL CHRISTMAS GIFT CAMPAIGN—Sponsored by the Electric Appliance Society, supported by the P. G. and E.

The campaign starts off with a large newspaper advertisement in 237 papers on the first week in December, followed by another advertisement on the week of December ninsteenth. We expect that both these ads will form the basis of a page or section of dealer "tie-in" advertisements.

Other campaign features will include: radio spot announcements on 20 stations, large 20x30-inch display cards, smaller 6x8-inch counter cards, publicity clip sheet, mat service, and a contest for ad writers and display men with cash and Treasure Island scrip as prizes.

Read your official Electric Appliance Society bulletin for complete details and start immediately with your own participating activities.

DEALERS: By watching this page from month to month you can keep informed of sales promotional campaigns to be sponsored by the Pacific Gas and Electric Company and the Electric Appliance Society. Detailed information will be supplied, as usual, through the mail. If such information is not received, call our local office or write Electric Appliance Society, 1355 Market St., San Francisco, Calif.

EW 112-1238

Here and Now

SCORES, perhaps hundreds of new houses are under construction right now in YOUR territory and other hundreds will be started early in the year. But a large proportion of these houses will be closed to your appliances or service during the lifetime of the building.

Other scores of houses are being remodeled and refinished. But a large percentage of the renewed homes will not be in the market for any new electrical appliances or service.

These owners who are building or remodeling because they want more satisfactory homes, are not going to have the comfort and convenience they want. You are not going to have a market for your products or service.

You can change all this and open these homes to the steadily increasing use of appliances and service by getting to each owner in your territory before the work is done and showing him the importance TO HIM of a good wiring job.

Utilities, manufacturers, dealers—in fact the whole industry is suffering today from "pin-it-up" wiring.

It's up to the industry to make a concerted effort and put adequate wiring at the head of the "must" list in every mind when building or remodeling is considered.

Make it your job to see that the owner or builder of every house built or remodeled in YOUR locality from now on is aware of the importance of having the house properly and adequately wired.

Pacific Coast Electrical Bureau

447 Sutter Street • San Francisco
601 West 5th St. • Los Angeles